Biological Assessment

for the

Revised Land and Resource Management Plan Amendment to increase Florida Scrub-Jay Management Areas on the Ocala National Forest (Amendment 12)

Lake, Marion, and Putnam Counties, Florida
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1.0 INTRODUCTION

This Biological Assessment (BA) considers the potential effects of the proposed Forest Plan Amendment described below on species listed as threatened or endangered under the Endangered Species Act of 1973. This document follows guidance provided in the US Forest Service Manual 2670 and the U. S. Fish & Wildlife Service (USFWS) Endangered Species Act Consultation Handbook. The best available science on TEP wildlife species was used to analyze potential effects, including recent scientific literature, correspondence with knowledgeable individuals in scientific/land management professions, field surveys, and personal observation.

The species addressed in this document are listed in Table 1. These species are known to occur or may occur in the areas affected by the proposed management changes. Table 2 contains four additional threatened or endangered species that occur in or near the Ocala National Forest (ONF) but were excluded from analysis here because the project area does not contain suitable habitat or is outside the known range of the species (rationale noted below the table).

Table 1. Federally Listed Wildlife and Plant Species Included in Analysis

Taxa	Scientific Name	Common Name
Bird	*Aphelocoma coerulescens*	Florida Scrub-Jay
Reptile	*Drymarchon corais couperi*	Eastern Indigo Snake
Reptile	*Neoseps reynoldsi*	Sand Skink
Plant	*Bonamia grandiflora*	Florida Bonamia
Plant	*Eriogonum longifolium* var. *gnaphalifolium*	Scrub Buckwheat
Plant	*Polygala lewtonii*	Lewton's Polygala
Plant	*Clitoria fragrans*	Scrub Pigeon-wing

Table 2. Federally listed species not included in this analysis

Taxa	Scientific Name	Common Name
Mammal	*Trichechus manatus* [1]	Florida Manatee
Bird	*Mycteria americana* [2]	Wood Stork
Bird	*Picoides borealis* [3]	Red-cockaded Woodpecker
Plant	*Nolina brittoniana* [4]	Britton's Beargrass

[1] The Florida Manatee is an aquatic mammal that occurs in rivers, canals, estuaries, lagoons, and bays throughout central and southern Florida. No proposed activities occur in or near any of the listed bodies of water.
[2] The wood stork is a large wading bird that occurs in wetland areas throughout Florida. Wood storks breed colonially in flooded freshwater and estuarine forested habitats. Per the design criteria, no swamps, prairies, marshes or open water are within the project area and therefore no proposed activities would impact the wood stork.
[3] The red-cockaded woodpecker occupies open sandhills habitats and builds cavities in large, old, live pine trees. The proposed project does not affect sandhills habitats.
[4] The Ocala National Forest only holds a small group of Britton's Beargrass individuals in the western section of the Forest Boundary. This occurrence of Britton's Beargrass is more than 4 miles from any forest stands proposed for changed management. It is reasonable to assume that no effects will occur from the proposed action.

2.0 CONSULTATION HISTORY

In accordance with the Endangered Species Act of 1973, as amended, and pursuant to Section 7 of said act, formal consultation on the Biological Assessment for the Revised Land and Resource Management Plan (LRMP or "Forest Plan") for National Forests in Florida was requested by the Regional Forester in a letter dated September 18, 1998 (US Forest Service 1999). On December 18, 1998, the U.S. Fish and Wildlife Service issued a Biological Opinion on the Revised Land and Resource Management Plan.

The Biological Opinion concurred with the Forest Service's "not likely to affect" determination for 13 federally listed species, and provided terms and conditions for incidental take for five wildlife species that received a "may affect – likely to adversely affect" determination. The Biological Opinion also stated that the "level of anticipated take [was] not likely to result in jeopardy to the species" for the Florida Scrub-Jay, Red-cockaded Woodpecker, Eastern Indigo Snake, Sand Skink, Flatwoods Salamander, and Flatwoods Salamander critical habitat (US Forest Service 1999). Issuance of the Biological Opinion concluded all formal consultation on the Forest Plan for the National Forests in Florida.

The Forest Plan has been amended 11 times, and three amendments changed management direction for scrub habitat and Florida Scrub-Jays on the Ocala National Forest:

- Amendment 4 (2006) removed standard VG-24, which required leaving areas of older sand pine.
- Amendment 7 (2007) added approximately 1,000ac to MA 8.4, the Scrub-Jay management area, and allowed for mechanical treatment instead of fire to maintain open scrub conditions.
- Amendment 8 (2009) combined sand pine management areas 8.1 and 8.2, increased the maximum sand pine opening size to 800ac and redefined the optimal age range of suitable nesting habitat for Florida Scrub-Jays from 3-15 years of succession to 3-12 years of succession.

All Forest Plan amendments underwent consultation with the USFWS regarding their potential effects to federally threatened or endangered species. Documentation is available on the National Forests in Florida website at http://www.fs.usda.gov/detail/florida/landmanagement/?cid=stelprdb5269794.

The US Forest Service initiated consultation with the USFWS in 2015 following the discovery of the federally endangered scrub pigeon wing on the Ocala National Forest. A BO was finalized Dec. 17, 2016, in which USFWS determined that implementing the Forest Plan was not likely to jeopardize this species.

The current document analyzes a proposal to amend the Forest Plan by increasing the acreage of Management Area 8.4 on the Ocala National Forest from approximately 3,000 acres to 55,000 acres and make several minor changes related to scrub management direction. All activities that would be implemented under this change have

been the subject of earlier consultation processes, but because this amendment would affect a large area of the forest, the Forest Service initiated consultation with the USFWS on the proposed new scale of Management Area 8.4.

3.0 PROPOSED ACTION

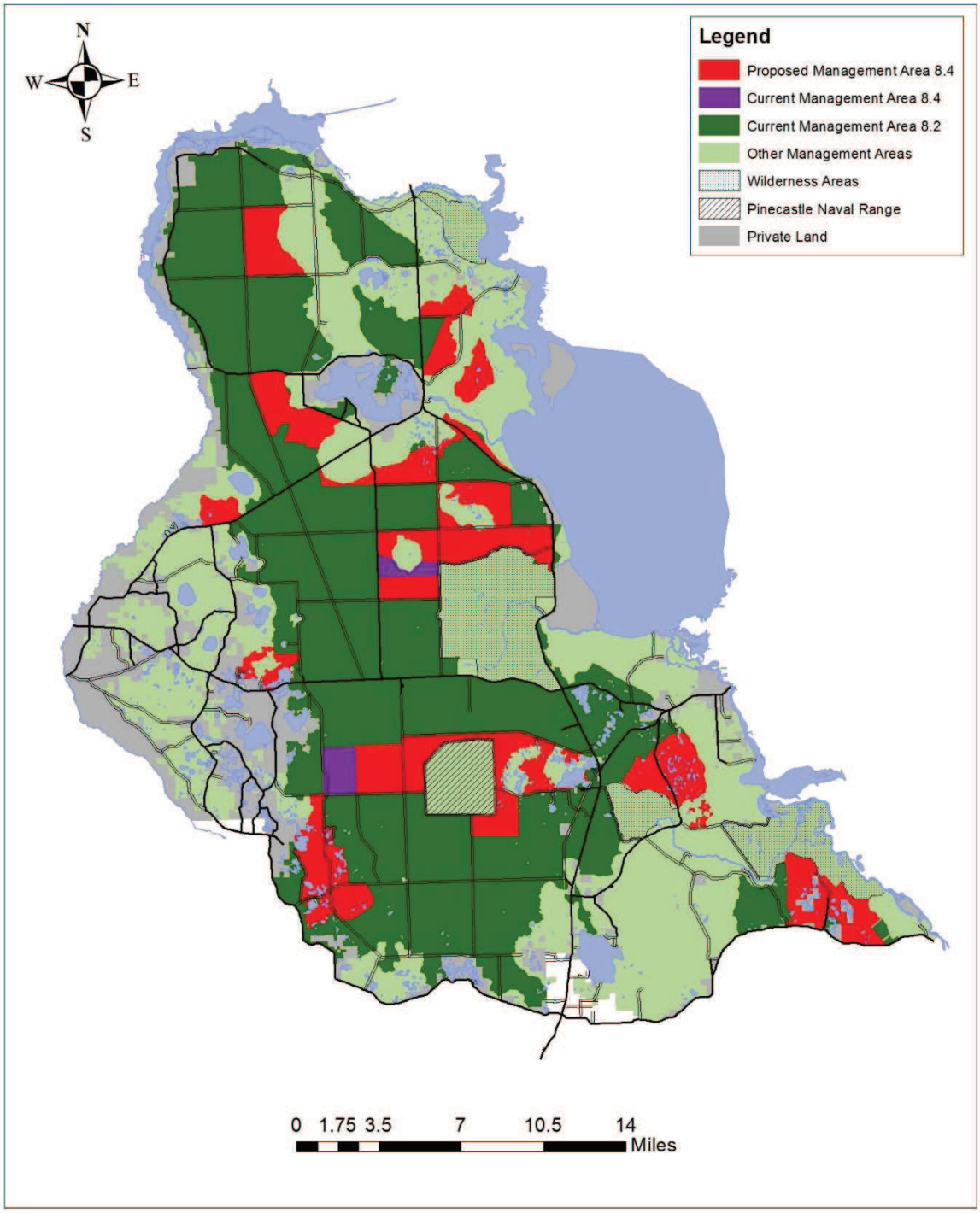
The proposed Amendment to the 1999 Forest Plan has three components: 1) Redesignate 51,850 acres from Management Area 8.2 (Sand Pine, Mixed Regeneration, Moderate Openings) into Management Area 8.4 (Scrub-Jay Management Area). Of this total area, 44,706 acres are scrub vegetation and the rest is prairies, lakes and pine flatwoods, 2) Revise the Desired Future Condition of Management Area 8.4 and the related Standard & Guideline 8.4-4 and 3) Add a newly discovered species, scrub pigeon wing, to the list of federally listed plants that occur on the Ocala National Forest and describe appropriate management considerations. These elements of the proposed amendment are described below, with particular emphasis on how actions under the amendment would differ from actions under the current Forest Plan direction.

Addition of new Scrub-Jay Management Areas

The US Forest Service, National Forests in Florida, is proposing to amend the 1999 Revised Land and Resource Management Plan (LRMP) by moving ~51,850 acres on the Ocala National Forest from Management Area 8.2 (Sand Pine, Mixed Regeneration, Moderate Openings) to Management Area 8.4 (Scrub-Jay Management Area). Eleven new Scrub-Jay Management Areas would be established and two existing Scrub-Jay Management Areas would be expanded, as shown in the map below. Fifty-one compartments on both districts and in all three counties within the ONF boundaries would be affected by the proposed change. See Appendix A for detailed maps of the thirteen proposed Management Areas.

The proposed change in MA designation would shift the primary management objective in these areas from producing sand pine to generating and maintaining conditions suitable for Florida Scrub-Jays and a suite of other animal and plant species with similar habitat requirements. Suitable Florida Scrub-Jay habitat is generally characterized by shrub layer heights ranging from 1 to 3 meters (3.2-9.8 ft.) tall, numerous patches of open bare ground, and low levels of pine cover (Fitzpatrick et al. 1991, Woolfenden and Fitzpatrick 1991). Optimal habitat within the suitable range has been described as having shrub layer heights of 1.2-1.7 meters (3.9-5.5 ft.), 10-40% bare ground cover, and less than 15% pine cover (Breininger 1992). Habitat taller than 3 meters has been associated with lower territory densities and decreased fledgling production and survival as compared to habitat with shrub layer heights less than 3 meters (Woolfenden and Fitzpatrick 1991). Shrub layer height is a key indicator for land managers to identify scrub habitat that is waning in habitat quality and in need of treatment to reset succession.

Proposed Extent of Management Area 8.4



Implementation of land management activities on the proposed new Management Area 8.4 would be contingent on adequate funding for increasing sand pine harvest as well as prescribed burning and mechanical treatments associated with continued maintenance after the final timber harvests have been completed. Therefore, the areas would be converted to open scrub over the next 20-30 years. Management within Management Area 8.2 would continue as described in the LRMP, focusing on production of merchantable sand pine. However, areas within MA 8.2 would still serve as habitat for Scrub-Jays as they have in the past, and planning of timber harvests and other relevant projects would still take Scrub-Jay habitat dynamics into consideration as well as the ecological needs of other scrub plant and animal species.

The following land management activities occur within Management Area 8.4:

- **Removal of sand pine** would occur to remove the overstory and set back succession. Sand pines of any age may be removed through commercial harvest or non-commercial methods such as roller-chopping or prescribed fire. Typical commercial timber harvest may be suitable for stands approximately 25 years old or older, whereas other methods to remove sand pine may be suitable in younger or less dense stands. Mature sand pine stands in MA 8.4 would harvested a final time with a clearcut using a feller-buncher, skidder, and loader and then would not be reseeded. Harvested stands may be roller-chopped and/or burned after harvest. Five hundred to 2,000 acres of sand pine would be removed per year collectively from the proposed new Management Areas. Final harvests of sand pine would progress on portions of different Management Areas over time and would be spread out over multiple future projects. Although sand pine harvest may be accelerated if the proposed amendment is approved, it is likely that the total area in which sand pine is harvested will be within the range of 3,900-4,100 acres described in the Forest Plan and consulted upon in the Forest Plan BA.

- **Roller-chopping** would prepare scrub habitat for prescribed burning operations by decreasing vegetation height and breaking apart vegetation to distribute and cure fuels. This activity uses large drums with blades that are spaced 12-18 inches apart. The blades sink 8-10 inches into the soil and typically disturb 90% of vegetation less than 6 inches in diameter. A roller-chopping layout that leaves intermittent areas of undisturbed vegetation (i.e., a “sloppy chop”) is encouraged to promote small-scale habitat variability. Roller-chopping would occur as a method of preparation prior to prescribed burning under two different conditions: 1) Post-harvest chopping would occur within a short period (typically 3-6 months) after a final sand pine harvest. A roller-chopper would run over the recently logged site to reduce the size of logging slash and coarse woody debris. This increases the exposed surface area of post-logging slash, allowing for quicker curing and greater consumption during the subsequent prescribed burn. 2) Pre-burn chopping may occur in scrub waning in habitat quality for Scrub-Jays. A roller-chopper would mash down the scrub vegetation in order to transform standing live fuels to downed dead fuels. This is often necessary to reduce flame heights and provide a ground fuel component to promote movement of fire

through the burn unit. In this type of application, the roller-chopper blades would not sink their maximum depth into the ground due to the presence of the shrub layer. However, the chopper blades would sink deeper into the ground in any areas of open bare ground within the treated stand.

- **Prescribed burning** would set back succession in scrub habitat or reduce post-harvest logging slash and coarse woody debris. *Post-harvest burning* would occur 3 to 6 months after sand pines are harvested a final time from MA 8.4 forest stands. This type of burning consumes the slash and coarse woody debris left over from logging and roller-chopping and regulates oak resprouting. *Maintenance burning*, or burning to set back succession, would occur once a scrub stand has become unsuitable or nearly unsuitable for Florida Scrub-Jays. Stands generally become unsuitable when the oak shrub layer becomes too tall (over 9 feet in height) and crowded. Scrub stands that have become too tall may be roller-chopped (see above) prior to burning because standing vegetation creates extremely tall flame heights which cause containment problems. Should the application of new techniques or particular spatial arrangements allow for safe burning and achievement of resource objectives without prior chopping, this option would be explored.

  The majority of prescribed burning operations in the near future are anticipated to occur in the fall or winter. Although prescribed burns coinciding with the natural fire season (late spring or early summer) are more desirable to mimic natural processes, fires occurring within these natural parameters in the scrub are often fast-moving, intense, and difficult to contain. That said, natural fire regimes are preferred and attempts would be made to mimic the natural fire season when safety, weather, and personnel allow.

The anticipated effects of these land management activities on federally listed species have been analyzed in the Biological Assessment for the Revised 1999 LRMP (US Forest Service 1999). A Biological Opinion, along with an incidental take statement, was issued by the USFWS in response to the Biological Assessment. This Biological Opinion was issued based on the acreage of Management Area 8.4 that was proposed in the Revised LRMP in 1999. The current proposed Amendment adds a significant acreage to MA 8.4, but does not add or modify any of the associated land management activities, with exception of Standard & Guideline 8.4-4 (see below).

Revision of Desired Future Condition for Management Area 8.4

A revised Desired Future Condition (DFC) was proposed for describing habitat conditions that would indicate treatment to reset succession was needed. The height of the shrub layer in the revised DFC is used as a trigger point for burning as opposed to specifying a desired age range. Topography, weather, the presence of mechanical treatments, and prior site conditions can all influence how quickly a stand grows over time. Using shrub layer height better represents conditions linked to habitat quality for Florida Scrub-Jays and other species.

Current DFC for MA 8.4:
In this area, the vegetation patterns consist of a mosaic of oak scrub patches. Patch sizes are generally governed by the presence of effective burning boundaries, but may be as large as 800 acres. Each patch is burned as needed to ensure that 70% of the patch has oaks 3-6 feet tall and to expose bare sand on the ground. The area looks different from the sand pine scrub in other management areas, because this area has only a very low density of sand pine overstory. Sand pine is deliberately removed by clearcutting, followed by frequent prescribed burns that kill sand pine seedlings as they try to establish. These conditions remain suitable for Florida Scrub-Jays for the next 15 to 20 years, but they gradually deteriorate as the shrubs fill in and the bare sand becomes covered with litter. At this point, the patch is burned to reset the conditions for the Scrub-Jay and other species. Evidence of plowed fire lines around previous fires is frequently encountered. The landscape is rarely interrupted by narrow road corridors.

Proposed revision for MA 8.4:
In this area, vegetation patterns consist of a mosaic of oak scrub patches. The patches are dominated by scrub habitat with high amounts of scrub oak cover, low sand pine cover, and scattered areas of open bare ground. The oak layer is less than 9 feet tall over most of the area and scattered areas of older habitat occur rarely across the landscape. Young, short scrub habitat is adjacent to older, taller scrub habitat that is decreasing in habitat quality for Scrub-Jays. Commercial timber harvests may occur within this area as merchantable sand pines are harvested for a final time. Mechanical treatment may occur after harvest as pre-burn fuel preparation technique or as a stand-alone treatment where application of fire is not advisable. Prescribed burning operations can be initiated whenever the habitat conditions begin to degrade. After an initial rotation, burns may become patchier as areas of open, bare ground prevent complete fuel consumption over the entire burn block. Patch sizes are generally governed by the presence of effective burning boundaries.

Modification of Standard & Guideline 8.4-4
Standard & Guideline 8.4-4 is proposed to be modified by removing the requirement to delay prescribed burning operations if active nesting is present. Burning scrub before the habitat has completely degraded maximizes habitat productivity for Scrub-Jays. Burning during nesting season may be necessary to treat and maintain the needed acreage of early successional scrub habitat on the landscape and to mimic natural processes for other species that occur during the most fire-prone months. See the direct effects analysis for the Florida Scrub-Jay below for a detailed discussion.

Current Standard & Guideline:
8.4-4 – After clearcutting, prescribe burn the area to start natural regeneration of scrub oak. Prescribe burn when the vegetation has grown so old that its quality as scrub-jay habitat is degraded. Delay burning if active nesting is present.

Proposed Standard & Guideline:
8.4-4 – After clearcutting, prescribe burn the area to start natural regeneration of scrub oak. Prescribe burn when the vegetation has grown so old that its quality as scrub-jay habitat is degraded.

Add scrub pigeon wing to the Forest Plan
Two populations of scrub pigeon wing (*Clitoria fragrans*), a federally threatened species, have recently been discovered on the Ocala National Forest. One population is in sandhill habitat and the other is in scrub habitat within the original MA 8.4 area. The discovery of this species constituted new information on listed species not previously considered, so consultation under Section 7 of the Endangered Species Act was reinitiated in Fall 2015. The USFWS determined that implementation of the Forest Plan would not likely jeopardize the continued existence of this species (USFWS Log No. 04EF 1000-2016-F-0110).

Proposed addition to Forest plan page 3-18:
Scrub pigeon wing. This endangered species is a long-lived perennial herb that is known only from high pine and scrub habitats on central Florida ridges. Forest Plan direction is consistent with the management considerations described for this species in the Multi-species Recovery Plan for South Florida (USFWS 1999).

The habitat preferences and responses to management activities of scrub pigeon wing are similar to those of three other listed species on the Ocala National Forest, Florida Bonamia, scrub buckwheat and small Lewton's milkwort. Therefore, no additional management standards or guidelines are required.

4.0 FEDERALLY ENDANGERED AND THREATENED WILDLIFE SPECIES

4.1 Species unaffected by the proposal
Four federally listed species in Table 2 above have ranges outside of the action area or do not use sand pine scrub or scrubby flatwoods habitats. **The proposed actions will have no effect on these species.**

4.2 Florida Scrub-Jay (*Aphelocoma coerulescens*)
Species status
The most recent surveys for Florida Scrub-Jays on the ONF were conducted in 2012-2014 and yielded estimates of 1100-1250 groups, which translates into approximately 2530-2875 individuals if an average observed group size of 2.3 birds per group is extrapolated to the entire population (Miller et al. 2015). These surveys were conducted entirely within Management Area 8.2 and did not include the higher quality habitat typically found in Management Area 8.4. The Florida Scrub-Jay population on the ONF has not been as thoroughly surveyed as the other two major populations due to the vast amount of potential habitat present and the infeasibility of conducting statistically robust surveys.

Direct effects
Timber harvest, post-harvest chopping, and post-harvest burning activities would not introduce any significant direct effects to the Scrub-Jay because the habitat would not be suitable at the time of treatment. Minor temporary noise disturbance may occur to Scrub-Jays with active territories near treatment stands. Some road maintenance activities may disturb small patches of scrub directly off road edges, but would not be expected to exert any significant direct or indirect effects on Scrub-Jays. Furthermore, these effects would not be different than those resulting from typical harvest of mature sand pine stands under the current management direction for MA 8.2. Off-highway vehicles would be unlikely to introduce any direct effects on Scrub-Jays, even in areas such as the proposed Northern Scrub-Jay Management Area where OHV trail density is high. Probability of a Scrub-Jay and OHV collision are low due to the birds' agility and the low vehicle speed required when riding the trail. Previous direct examination of a female Scrub-Jay brooding when passed by OHVs within 300 feet showed that the female did not flush from the nest when exposed to noise disturbance (USFS, unpubl. data), so a direct effect on nesting birds via altered nesting behavior is also highly unlikely.

Pre-burn chopping and maintenance burning performed outside of the nesting/fledgling season would not introduce mortality risk to adult or juvenile Scrub-Jays because individuals could easily evade machinery. However, these activities could displace Scrub-Jay groups even in habitat of waning quality. Scrub-Jays forced to abandon their territories and establish territories in new habitat may experience temporarily increased predation pressure when looking for new habitat. Ensuring suitable habitat is available near stands scheduled to be burned during future project development would minimize the effects of this disturbance.

Maintenance burning or pre-burn chopping performed in occupied habitat during the nesting/fledging season (approximately March 1 to June 30) would introduce mortality risk to a limited amount of eggs, nestlings, and fledglings. Because chopping may be conducted throughout the year, this activity would rarely, if ever, be conducted in suitable breeding habitat during the breeding season. However, nests with eggs or nestlings and very young, immobile fledglings (up to 25 days old)[5] could be killed by prescribed burn operations occurring within active territories. Breeding pairs that have not initiated nesting or are between nesting attempts would lose out on breeding opportunities, but may be able to establish a new territory and could attempt to breed nearby. Because maintenance burning and pre-burn chopping would only occur in habitat waning in quality, the number of nests, nestlings, and fledglings that could potentially be impacted would be limited because territory density would be low. Due to the extensive search time required to find nests and the large annual acreage that

[5] Scrub-Jays fledge about 18 days after hatching, can fly short distances after additional 7 days, and are considered "capable fliers" after an additional 14 days (Woolfenden and Fitzpatrick 1996). Due to the slow desired rate of spread for most scrub burns, Scrub-Jays older than 25 days can be considered capable of escaping a prescribed burn.

would be required to be burned for implementation, any mitigations requiring locating individual nests would be prohibitive.

The potential number of affected eggs/nestlings/fledglings would also be further limited by the number of available burning days occurring within the nesting season. Scrub habitat must be burned under a narrow range of conditions to ensure that fireline intensity and flame lengths are high enough to achieve full consumption of the oak layer, but not high enough to threaten containment lines. This is achieved by burning when live woody fuel moistures are below 110% (which is influenced by the state of vegetative development and days since rain), but when drought indexes are low (Custer and Thorsen 1996). This often requires a lack of rain within the past 7-14 days to lower fuel moistures, but sufficient rain within the preceding several weeks or months to lower drought indexes. This often precludes burning the scrub during the wetter months of June and July when daily thunderstorms are common. Relative humidity (desired range of 35-50%) and midflame wind speeds (2-5 mph) are also factors of concern when burning scrub.

Although burning potentially occupied habitat during the nesting season presents a cost in the form of potential mortality to a limited number of eggs/nestlings/fledglings, there are crucial benefits. Performing maintenance burns prior to complete abandonment by Scrub-Jays is necessary because the species often continues to occupy poor habitat due to the species' high degree of site fidelity. Maintenance burning occupied scrub habitat waning in quality promotes effective and safe achievement of prescribed burning objectives because poor habitat conditions for the Scrub-Jay are also unfavorable conditions for burning. As the habitat ages, the oak layer becomes tall and crowded. This tall, crowded arrangement begins to shade out the already sparse ground cover important for carrying fire through the burn unit. Burning when the oak layer is shorter also requires a lower flame height to achieve complete consumption of the oak layer and therefore lower fireline intensity is required, which in turn promotes safe containment of the burn within its boundaries. Additionally, burning initiated during the time period when fire has historically occurred in the scrub also benefits endemic plant species by providing stimuli such as heat and smoke that are important components of their life cycles (see Effects Analyses for listed plants below).

Most importantly, burning scrub before it completely degrades allows the habitat to be more productive for Scrub-Jays over the long term (see Appendix B). As habitat degrades in quality, demographic parameters such as nest success and juvenile/adult survival decrease in response to higher predation pressures. Eventually a point is reached where breeding bird mortality exceeds recruitment. The result is a net loss of birds or a "population sink". High quality habitat is usually a net producer of birds or a "population source". If habitat is burned on a rotation that minimizes the time spent as a population sink and maximizes the time spent as a population source, the habitat will provide the greatest amount of conservation value for the species. Therefore, the benefits of burning occupied habitat (maximizing productivity over time, promoting successful prescribed burning implementation, mimicking natural fire regimes) easily outweigh the costs (potential for limited amount of egg/nestling/fledgling mortality).

Since the acreage of MA 8.4 is proposed to be significantly increased from the level described in the 1999 Forest Plan, the actions associated with mortality risk (burning occupied habitat during the nesting season) would also increase beyond the level described in the Biological Assessment for the 1999 Forest Plan. As implementation proceeds and scrub acres burned per season increase, the amount of potential exposure to risk would also increase, but so would the ability of the local and greater population to absorb any losses. More importantly, as described above, burning occupied habitat maximizes productivity and permitting burning during the nesting season would allow land managers to burn the acreages needed to maintain all proposed 8.4 MAs in their desired state.

Indirect effects
Timber harvest, chopping, and burning all have the indirect effect of creating new early successional scrub habitat. Florida Scrub-Jays would experience multiple indirect benefits as a result of increased early successional scrub at the landscape level. Multiple adjacent openings could create large blocks of multi-aged suitable habitat. Large blocks minimize the number of territories that border mature forest edge. Increased distance to forest edge has been associated with higher daily nest survival rates for Florida Scrub-Jays, presumably because snakes use forest edges (Carter et al. 2011). Mature forest edge is also home to aerial predators such as Cooper's Hawks (*Accipiter cooperii*) that can limit recruitment as they often target the less agile young of the year.

Increased habitat quantity would also mean that fewer Scrub-Jays would need to conduct extensive extra-territorial forays in search of new habitat. Such forays are often associated with higher predation pressure as individuals move through an unfamiliar habitat (mature sand pine scrub) with a different suite of predators than in the familiar structure of early successional scrub. Increased habitat quality is likely to translate into increased nest success and increased survival of young. A more open habitat structure provides less cover for ground predators and would allow for less time spent on predator vigilance by group members and more time spent provisioning for themselves and for nestlings. Overall, the proposed changes would provide significant long-term beneficial indirect effects for the Florida Scrub-Jay.

Cumulative effects
Continued management or restoration of early successional scrub habitats in adjacent state-owned lands such as Seminole State Forest and Lower Wekiva River Preserve State Park would promote dispersal of Scrub-Jays throughout the larger scrub landscape (Genetic Unit D in the Florida Scrub-Jay Recovery Plan (USFWS, in progress)), which in turn would foster increased genetic diversity as previously isolated groups interact. Increased overall habitat on the greater landscape would also decrease the amount of unsuitable habitat Scrub-Jays would need to cross to find suitable habitat. All remaining scrub habitat in the region is located to the southeast of the ONF. No other actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect the Florida Scrub-Jay.

Determination of Effects
The effects determination of the proposed action on the Florida Scrub-Jay is **"may affect – likely to adversely affect"**. There would be increased exposure of nestlings to mortality risk from prescribed burning or pre-burn chopping operations during the nesting season. However, the amount of exposure would be extremely limited due to degrading habitat conditions and a limited number of burning days per year. This limited mortality risk is necessary to maximize habitat productivity for the species. Estimates for habitat dynamics, scrub-jay carrying capacity, displacement from territories and potential destruction of nest is provided in Appendix B.

4.4 Eastern Indigo Snake (*Drymarchon corais*)

Species status
There has been no detailed survey work on the ONF over the last ten years and there are no references in the literature regarding empirically derived estimates of the Eastern Indigo Snake population on the ONF. Individuals are known to occur in the Forest based on confirmed sightings from ONF personnel and cooperators (Enge et al. 2013).

The Eastern Indigo Snake uses a wide range of habitats, including pine flatwoods, scrub, scrubby flatwoods, high pine/sandhills, and wet prairies (Moler 1992). All of these habitats are found in the Ocala National Forest. In addition, Moler also states that "in xeric habitats, especially those in north Florida, the future status of the Indigo Snake is closely tied to that of the Gopher Tortoise". Based on the presence of the range of preferred habitat types and a Gopher Tortoise population present in the xeric habitats, Eastern Indigo Snake occurrence within suitable habitats on the ONF can be assumed.

Direct effects
The Biological Assessment for the 1999 Forest Plan identifies "ground-penetrating mechanical site preparation, heavy equipment use, and/or off-road vehicle use" as potential causes for Eastern Indigo Snake mortality. While Eastern Indigo Snakes are unlikely to be killed by slow-moving heavy machinery associated with timber harvest and post-harvest roller-chopping, there would exist some potential for individuals occupying Gopher Tortoise burrows that collapse from heavy machinery to be killed. The chances of this occurring are mitigated by Standard & Guideline WL-11, which was implemented in the 1999 Forest Plan and expanded in Forest Plan Amendment #8 (US Forest Service 2009). This Standard & Guideline establishes a buffer of 25 feet between known tortoise burrows and heavy equipment operation, log landings, designated skid trails, and equipment parking. This standard is wider than a recent recommendation of a 15-foot buffer (Smith et al. 2015). Standard & Guideline WL-10 also mitigates potential harm to Eastern Indigo Snakes by educating personnel, cooperators, and contractors on identifying the species and protecting them from harm (by moving around them) if encountered.

Pre-burn chopping would not be ground-penetrating to the degree of post-harvest chopping, as there would be standing vegetation prior to chopping as opposed to just logging slash. Deeper ground penetration could occur in areas with open bare ground,

but this would be over a fraction of the burn unit. Based on the lower amount of ground disturbance from chopping in this context, the presence of Gopher Tortoise burrows as refugia, and the Guidelines in place to protect those refugia, the chances of mortality from pre-burn roller-chopping is extremely low. Although the activities associated with potential harm or mortality are also conducted in the 8.2 MAs, these activities would be occurring more frequently over time and thus the expected amount of exposure would be greater than associated with the current Forest Plan. This difference is insignificant since the exposure risk is small to begin with, and the additional exposure would be marginal (a maximum of two additional pre-burn chopping events over a 50-year period).

Prescribed burning activities would introduce a very low risk of mortality or injury due to the slow progression of prescribed burns in the scrub, the agility of the species, and the presence of Gopher Tortoise burrows in the scrub.

Indirect effects
The landscape-scale increase of early successional scrub would indirectly benefit the Eastern Indigo Snake by increasing and maintaining suitable habitat for the Gopher Tortoise and maintaining habitat quality for small vertebrate prey species such as lizards, frogs, and small mammal species. Timber harvest activities would indirectly benefit the Eastern Indigo Snake by creating a variety of open microhabitats that would attract prey species and assist in body temperature regulation. Pre-burn chopping and prescribed burning would stimulate ground cover abundance and diversity and increase habitat quality for Gopher Tortoises. Increased tortoise abundance would indirectly benefit the Eastern Indigo Snake by providing refugia and egg-laying sites. Home ranges would likely shift as some stands grow and others are harvested or otherwise set back to early successional states.

Cumulative effects
Continued management or restoration of sandhills, flatwoods, or scrub habitats by surrounding state or local land management agencies would benefit the Eastern Indigo Snake by increasing available habitat and providing habitat for the Gopher Tortoise. Sunnyhill Recreation Area (St. Johns Water Management District) and Seminole State Forest (Florida Forest Service) are examples of areas that currently manage sandhills and flatwoods habitats that border the ONF. No other actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect the Eastern Indigo Snake.

Determination of Effects
The effects determination of the proposed action on the Eastern Indigo Snake is **"may affect – likely to adversely affect"**. Ground-penetrating heavy equipment use during timber harvest actions and post-harvest chopping may harm or kill Eastern Indigo Snake individuals. Due to secretive nature of the species and its large home range, the anticipated number of individuals impacted cannot be determined, but is not expected to be significant. Any mortality would be the result of chance encounters, and would be comparable to harm under implementation of the current Forest Plan. Multiple

Standards & Guidelines are in place to protect the Eastern Indigo Snake and an important commensal species, the Gopher Tortoise. Management of 8.4 MAs would create and continually maintain habitat for both the Gopher Tortoise and the Eastern Indigo Snake.

4.5 Sand Skink (*Neoseps reynoldsi*)

Species status

Like the Eastern Indigo Snake, there has been no detailed survey work on the ONF over the last ten years and there are no specific references in the literature regarding empirically derived estimates of the population on the ONF. Staff biologists regularly observe signs indicating presence in several areas on the Forest.

Using the elevation and soils criteria described in the Peninsular Florida Species Conservation and Consultation Guide for the Sand Skink and Blue-tailed Mole Skink (USFWS 2012), the ONF has approximately 170,039 acres of potential sand skink habitat[6]. 2,825 acres of this potential sand skink habitat is within current 8.4 MAs and the proposal would add 18,437 acres of potential sand skink habitat that currently resides within proposed 8.4 MA boundaries.

Direct effects

Timber harvest and chopping operations introduce some risk of harm or mortality to Sand Skinks from heavy machinery operations. Mature sand pine scrub is not ideal sand skink habitat, but open sandy areas on the periphery of harvest stands may contain skinks, but the chances of mortality would be insignificant based on the extremely limited exposure potential. Post-harvest chopping introduces a higher degree of risk due to the deeper ground penetration from the chopping blades and the more favorable habitat conditions for the species at the time of treatment. However, Sand Skinks are slow to colonize new habitat because of their slower movement abilities, and the shorter span of time between harvest actions and post-harvest chopping (typically 3-6 months) does not allow much time for skinks to colonize, so potential effects would be limited. OHV use could potential cause mortality in skinks crossing OHV trails near the soil surface during traffic, but these would be chance encounters, and skinks traveling even a couple inches beneath the surface would be unaffected.

Pre-burn chopping presents a lower risk of harm or mortality for Sand Skinks. The species spends much of its time burrowed from 1 to 8 inches deep in sandy soils (Christman 1992) and thus would not be at risk of being crushed, especially when the chopper is not penetrating deeply into the ground. Individuals on the surface or occupying open bare sandy areas may be killed if present where the chopper blades make direct contact with the ground. These occasions would be chance encounters. As discussed above in the Eastern Indigo Snake section, there would be a maximum of two additional pre-burn chopping events over a 50-year period when comparing the proposed Amendment with the current Forest Plan, a negligible increase in mortality risk.

[6] Note that 5-foot contour data was used and thus the elevation criterion was set at 80 feet above mean sea level versus the recommended 82 feet.

Indirect effects
The landscape-scale increase of early successional scrub would yield significant indirect benefits for the Sand Skink. Maintaining scrub in an early successional state over time would maintain constant habitat suitability for the Sand Skink. Scrub stands subject to reforestation activities experience a loss of habitat suitability over an extended period of time until re-harvested. Local abundances should increase because Sand Skinks present in young scrub would no longer have to emigrate from stands as the root systems of young or mature sand pines would not limit their movement as stands aged. This is crucial for a species with limited dispersal ability such as the Sand Skink. Large early successional openings may also allow for interaction between previously separated local populations, thereby increasing genetic diversity.

Cumulative effects
Continued management or restoration of sandhills or scrub habitats by state or local land management agencies would benefit the Sand Skink by increasing available habitat. Because of the species' limited dispersal ability and fossorial nature, habitat even in bordering lands may be inaccessible due to presence of paved roads, so interaction between small subpopulations between lands would likely be limited. No other actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect the Sand Skink.

Determination of Effects
The effects determination of the proposed action on the Sand Skink is **"may affect – likely to adversely affect"**. Ground-penetrating heavy equipment use during timber harvest and chopping activities may harm or kill Sand Skinks. Because of the difficulty in detecting the species due to its fossorial nature, the number of individuals affected cannot be determined but is not expected to be significant as any mortality events would be chance encounters. The proposed action would significantly improve habitat availability and suitability for the Sand Skink at the landscape level.

4.6 Florida Bonamia (*Bonamia grandiflora*)

Species status
Florida Bonamia is widely distributed across the Ocala National Forest, centered in openings and disturbed areas in white sand scrub habitats but also occurring in occasional mature sand pine habitat with little midstory component. The species was last formally monitored in 2007 (Jenkins et al. 2007), when observers described the presence of Florida Bonamia in survey areas as "widespread and numerous" in suitable habitat. The species is frequently seen flowering within a year of timber harvest by Forest personnel.

Direct effects
Harvest operations in stands with sparse canopy cover and roller-chopping prior to prescribed burning operations may disturb the horizontal stems of Florida Bonamia individuals, but the root systems would remain intact and individuals could resprout. A few individual plants may be extirpated in small areas that receive extensive ground

disturbance such as log landings. These effects would be localized and would not create a significant impact on the ONF population of Florida Bonamia. Prescribed burning activities would only impact surficial stems and would not be a concern regarding plant mortality.

The Biological Assessment for the 1999 LRMP states that Florida Bonamia individuals "could be killed by ground-penetrating mechanical site preparation, heavy equipment use, and/or off-road vehicle use". The continued occurrence of Florida Bonamia in areas that experience these disturbances strongly suggests that the species would persist in the presence of disturbances related to the proposed Amendment. Any mortality would not be expected to be significant, even to local populations of Florida Bonamia.

Indirect effects
The activities associated with MA 8.4 management would remove the canopy layer and increase areas of open bare ground, both conditions favorable to Florida Bonamia. Extant vegetative individuals would likely persist after any necessary mechanical treatment, and fire would stimulate flowering, seed set, and germination in the species (Jenkins et al. 2007). Occurrence and abundance would be expected to increase as the acreage of early successional scrub habitat increases. Hartnett and Richardson (1989) found that Florida Bonamia seeds are "long-lived and accumulate within the soil over time", therefore Florida Bonamia should be expected to appear after harvest, even in mature sand pine stands where no individuals currently exist aboveground. The observed ability of the species to resprout vegetatively after mechanical and fire disturbance, the persistence of the seed bank in the soil (Hartnett and Richardson 1989), and the creation and continued maintenance of favorable habitat conditions over a significant area make it highly likely that Florida Bonamia occurrence and abundance would increase on the ONF landscape as an indirect effect of implementation of the proposed Amendment.

Cumulative effects
The only known public property with scrub that borders the ONF is Seminole State Forest. Continued management or restoration of early successional scrub by the state or other land management agencies would benefit Florida Bonamia by increasing available habitat and promoting open conditions favorable to the species. No other actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect Florida Bonamia.

Determination of Effects
The effects determination of the proposed action on the Florida Bonamia is **"may affect – likely to adversely affect"**. There is potential for Florida Bonamia individuals to be killed by heavy equipment use. However, this species is adapted to disturbance and has demonstrated the ability to recover after the disturbances associated with the proposed action. The change in management from MA 8.2 to MA 8.4 would create and maintain habitat conditions on the landscape that are favorable to the species, and any mortality would not be expected to impact even local populations. Overall, the expected

effects from activities implemented under this proposed amendment are within the scope of effects previously disclosed in the Forest Plan BA and evaluated in the USFWS Dec. 18, 1998 Biological Opinion.

4.7 Lewton's Polygala (*Polygala lewtonii*)

Species status

Lewton's Polygala (LP) on the ONF is primarily associated with sandhills habitat, but the species can also be found in open early-successional scrub habitat and sandhills-scrub ecotones. Three areas of high LP abundance are known on the ONF, all occurring on regularly burned sandhill habitat: Hughes Island, Pat's Island, and Salt Springs Island. The population on Hughes Island has been described as "remarkably large and vigorous" and 0.31-acre plots on both the Hughes Island and Pat's Island populations have recorded more than 1,000 individuals per plot in some years (Jenkins et al. 2007; FNAI, unpublished data). None of these three areas are included as a proposed 8.4 MA in the proposed Amendment. LP occurrence outside of these areas is scattered and low in density with all identified occurrences in the scrub consisting of fewer than 25 individuals and "occurring mostly along firebreaks or sand roads" (Jenkins et al. 2007).

Direct effects

Harvest operations are not anticipated to create direct effects on LP because mature sand pine stands lack adequate sunlight on the forest floor. There is little available research on the direct impacts of roller-chopping on LP in open stand conditions. Post-harvest and pre-burn roller-chopping may kill individuals located in open bare ground. Lewton's Polygala does not have a trailing vine-like habit or significantly deep root system, and thus individuals could be killed. However, the number of LP individuals impacted is not anticipated to be significant because in order for mortality to occur a chopping blade would have to directly impact the root system, and the chances of a "direct hit" are low. Also, the distribution of LP within scrub stands are scattered and isolated – thus the chances of multiple individuals being directly affected by any chopping operations is even smaller. There are no known LP occurrences near OHV trails.

Aboveground vegetation of individuals may be consumed during prescribed fire activities, but the root systems persist and individuals would be unlikely to experience mortality as a direct result of burning. The species has a positive relationship with fire, as investigations have showed significantly higher germination rates in response to smoke exposure (Lindon and Menges 2008) and individuals are known to resprout quickly after fire (USFWS 1999). Management using the described activities at the significantly increased scale proposed here is unlikely to create negative direct effects at a level significant to the Lewton's Polygala population, either at the local or landscape level.

Indirect effects

The activities associated with MA 8.4 management would promote removal of a mature canopy layer and increase areas of open bare ground, both conditions favorable for Lewton's Polygala. Proposed new 8.4 MAs bordering sandhill habitats would be

expected to provide the best chances of providing new LP occurrences, as the species is noted as "more common in the transitional areas between [oak scrub and high pine]" (USFWS 1999). Smoke exposure from prescribed burning would increase germination in aboveground individuals (Lindon and Menges 2008).

Cumulative effects
There no known extant Lewton's Polygala populations in any state, tribal, local, or private lands bordering the ONF. No actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect Lewton's Polygala.

Determination of Effects
The effects determination of the proposed action on the Lewton's Polygala is **"may affect – likely to adversely affect"**. There is potential for LP individuals to be killed by heavy equipment use during timber harvest or chopping activities. Due to low abundance in scrub habitats, the number impacted would not be significant. The change in management from MA 8.2 to MA 8.4 would create and maintain habitat conditions favorable to the species. Overall, the expected effects from activities implemented under this proposed amendment are within the scope of effects previously disclosed in the Forest Plan BA and evaluated in the USFWS Dec. 18, 1998 Biological Opinion.

4.8 Scrub Buckwheat (*Eriogonum longifolium* var. *gnaphalifolium*)
Species status
Known Scrub Buckwheat occurrences are scattered across the ONF, located in clearcuts or stand edges in yellow sand scrub habitats and turkey oak sandhills. Populations vary widely in plant abundance, ranging from 1 or 2 individuals up to 100. Five monitoring plots were established in July 2014, and counts in 8 total plots averaged about 22 Scrub Buckwheat individuals per plot, but counts were highly variable (standard deviation of 30.8; FNAI, unpublished report). Counts in one year do not give a good indication of abundance, and smaller populations sometimes cannot be found in visits over multiple years. As the U.S. Fish & Wildlife Service 5-year review states, "any quantification based on individual plant counts would have little meaning since scrub buckwheat populations vary considerably depending on when counts are made relative to time-since-fire" (USFWS 2008). The plots set up in 2014 were established to provide abundance data over a period of time and future counts should provide meaningful trend data.

Direct effects
Although mature sand pine scrub does not provide ideal habitat conditions, Scrub Buckwheat has occasionally been found in mature sand pine scrub stands with an overstory. Scrub Buckwheat individuals located in such habitat may be impacted by harvest machinery, subsequent roller-chopping (either post-harvest or pre-burn), and OHV use, but the species has a woody taproot which would likely persist through such disturbance. "Numerous and widespread" Scrub Buckwheat plants described as "vigorous and blooming profusely" have been found in areas recently clearcut and roller-

chopped (FNAI, unpublished report), therefore individuals are likely hardy enough to endure this amount of disturbance.

Scrub Buckwheat is known to exhibit resprouting, flowering, and strong seedling establishment after fire (Carrington 1999). As a result, the species responds vigorously for a year or two after the application of fire. Based on this close relationship with fire, consumption of the aboveground vegetative portions of the plant is unlikely to cause significant mortality in local or landscape scale populations. Instead, fire suppression would have more significant effects on the species.

Indirect effects
Harvest activities and pre-burn roller-chopping would indirectly benefit Scrub Buckwheat by removing canopy cover, increasing open space, and decreasing competition, but the biggest benefit from these activities would be the promotion of treatment by fire. Scrub Buckwheat resprouts and flowers after fire and exhibits strong, short, and quick seedling establishment after flowering (Carrington 1999). As the acreage of burned early successional scrub habitat increases, one should expect an increase in Scrub Buckwheat occurrence, particularly for 1-2 years after the application of fire.

Establishing a fire return interval of 15-20 years would maintain favorable habitat conditions consistently over a long period of time. Seed present in the soil deposited from extant individuals would not have to remain senescent in the seed bank for extended periods of time, and repeated applications of fire may cause a sustained rise in the number of individuals. Abundance would still be expected to rise and fall with the application of fire even in consistently burned areas, but staggering the burning rotation of habitat blocks within Management Areas would ensure that multiple areas of habitat would have the expected flush of flowering individuals expected after burning. As with the other listed plant species, an increase in abundance and range should increase genetic diversity within the greater ONF population.

Cumulative effects
Element Occurrences for Scrub Buckwheat exist on Seminole State Forest, located across County Road 42 from the proposed Bilderback Management Area. However, there are no known Scrub Buckwheat occurrences within this proposed MA or surrounding areas on the ONF. Regardless, management with fire may create conditions favorable to seeds senescent in the seed bank, and similar management on both sides of the road would benefit Scrub Buckwheat. There are no other known populations of Scrub Buckwheat on state, tribal, local, or private lands adjacent to the ONF. No actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect Scrub Buckwheat.

Determination of Effects
The effects determination of the proposed action on the Scrub Buckwheat is **"may affect – likely to adversely affect"**. There is potential for Scrub Buckwheat individuals to be killed by heavy equipment use during timber harvest or chopping activities, but the species has a woody taproot which would likely persist through such disturbance. The

addition of 8.4 MAs would create and maintain habitat conditions favorable to the species. Overall, the expected effects from activities implemented under this proposed amendment are within the scope of effects previously disclosed in the Forest Plan BA and evaluated in the USFWS Dec. 18, 1998 Biological Opinion.

4.9 Scrub Pigeon-wing (*Clitoria fragrans*)

Species status

On May 7, 2014, a Florida Natural Areas Inventory employee discovered a group of Scrub Pigeon Wings individuals on the Seminole Ranger District of the ONF. A second location was later found on the Lake George Ranger District in 2015. These are the only two current confirmed locations of the species on the Ocala National Forest. The initial vouchered location is in sand pine scrub habitat and the second location is in xeric high pine/sandhills. Scrub Pigeon Wings is very similar in appearance to *Clitoria mariana*, a common species in the scrub and sandhills of the ONF, and a *Desmodium* species that has a similar habit and leaf shape, but very different fruits and flowers (USFWS 1999, J. Surdick, pers. comm.). Given this similarity and the fact that Scrub Pigeon Wings was found in two habitats, it is likely that there are additional undiscovered locations elsewhere in the ONF.

Direct effects

Scrub Pigeon Wings individuals have previously been found in habitat "that had not been burned in 30 years" (USFWS 1999) in other locations, so individuals could exist in mature sand pine scrub habitat subject to a final timber harvest. Individuals in mature sand pine stands could be disturbed or killed by harvest activities, but the chances of this are insignificant due because: 1) there is low potential for occurrence in mature sand pine scrub; and 2) Scrub Pigeon Wings possesses a thick rhizome. This rhizome would protect it from disturbance during harvest activities, although aboveground vegetation may be crushed (NatureServe 2015).

There is little empirical information in the literature on the effects of mechanical disturbance on Scrub Pigeon Wings. Like many other species adapted to fire-prone habitats, Scrub Pigeon Wings possesses a long woody taproot (in addition to the rhizome) from which it resprouts after fire. The taproot can range from 0.5 to 2 meters (19.6-78.7 inches) in length and thus extends well beyond the 0.2-0.25 m (8-10 in.) that roller-chopper blades sink into the ground (NatureServe 2015). Roller-chopping prior to burning would mash down the scrub vegetation instead of crushing vegetation or coarse woody debris into small pieces, and thus the chopper blades would not penetrate the ground as deeply. While newly resprouted individuals that have not established a deep taproot could be subject to mortality, the main direct effect expected from roller-chopping and prescribed burning activities would be the crushing or consumption of the aboveground vegetative body. There no OHV trails near the two known Scrub Pigeon-Wings occurrences.

Indirect effects

Harvest, roller-chopping, and prescribed burning activities would remove or reduce the canopy layer, increase areas of open bare ground, and decrease competition –

conditions favorable to Scrub Pigeon Wings. Expansion of the Southern Scrub-Jay Management Area may reveal future subpopulations near the original vouchered specimen. On a larger scale, the increased amount of early succession habitat may reveal additional occurrences on the landscape.

Cumulative effects
There are no current populations of Scrub Pigeon Wings on the ONF that are located near state or private lands. Potential habitat exists in Seminole State Forest to the southeast of the ONF but there is a paved county road between the two properties. Ongoing activities to improve Florida Scrub-Jay habitat on the Seminole State Forest would benefit Scrub Pigeon Wings. No actions by state, tribal, local, or private entities are known or reasonably certain to occur within the action area that may affect Scrub Pigeon Wings.

Determination of Effects
The effects determination of the proposed action on the Scrub Pigeon Wings is **"may affect – likely to adversely affect"**. There is potential for individuals to be killed by heavy equipment use during habitat management activities. However, this species is adapted to disturbance and can persist via its thick rhizome and long taproot. The number of individuals affected cannot be determined but the level of impact is not expected to be significant. Habitat conditions would be maintained or improved as a result of the activities within the proposed Amendment. Overall, the expected effects from activities implemented under this proposed amendment are within the scope of effects previously disclosed in a recent BA and evaluated in the USFWS Dec. 17, 2015 Biological Opinion.

5.0 DETERMINATION OF EFFECTS

Based on the preceding analysis of the effects on federally listed threatened and endangered species, I make the following determinations that the proposed actions will have the following effects:

- **No effect** on the Florida Manatee, Wood Stork, Red-cockaded Woodpecker, and Britton's Beargrass.

- **May affect - likely to adversely affect** the Florida Scrub-Jay, Eastern Indigo Snake, Sand Skink, Florida Bonamia, Lewton's Polygala, Scrub Buckwheat, and Scrub Pigeon Wings. However, the effects of implementing land management activities under the proposed amendment is similar to the effects of the current Forest Plan direction for the four plant species. The Florida Scrub-Jay, Eastern Indigo Snake and Sand Skink would likely experience higher probability of harm due to the more frequent use of heavy equipment and fire under the proposed MA change, but would also have substantially more high-quality open scrub habitat.

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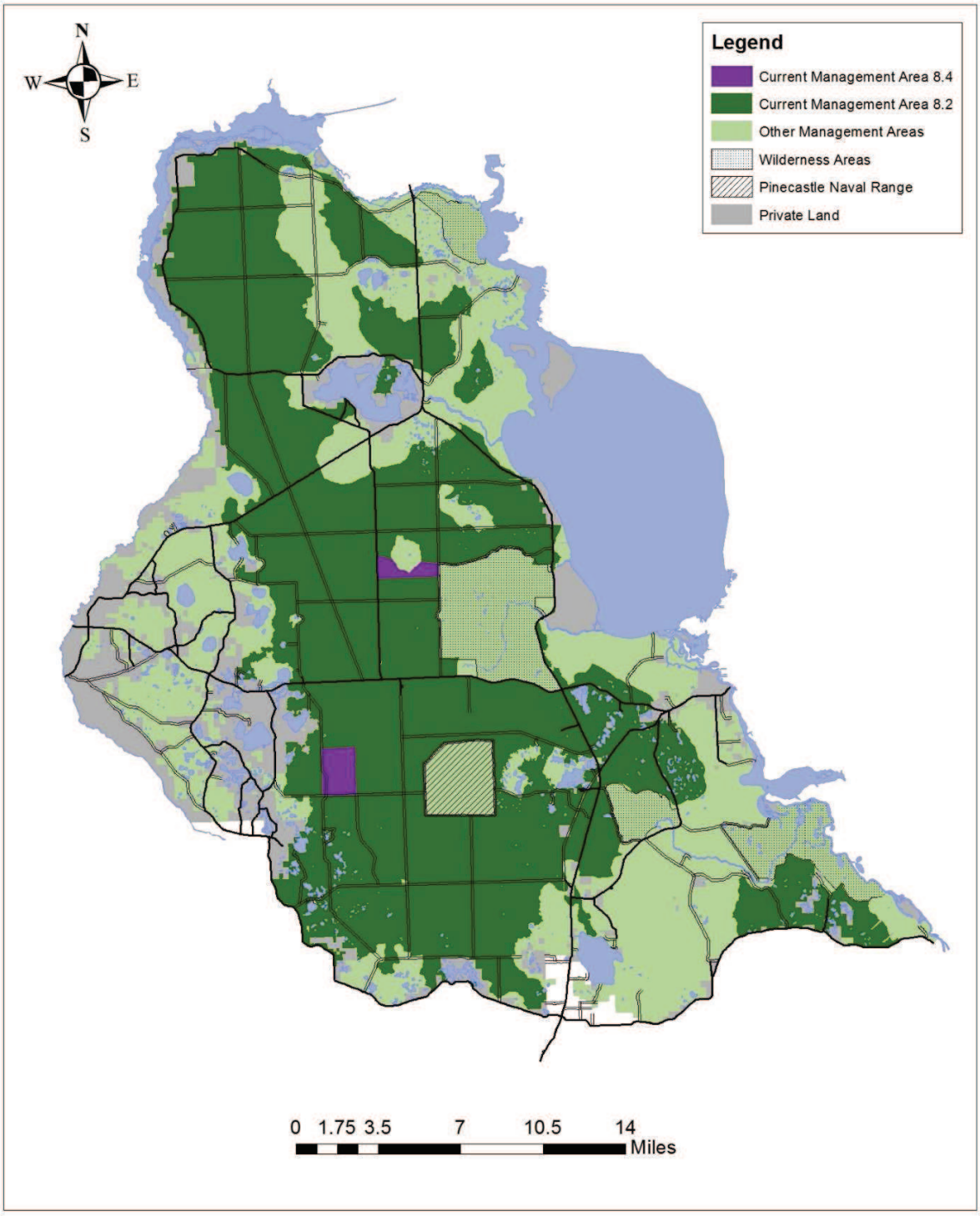
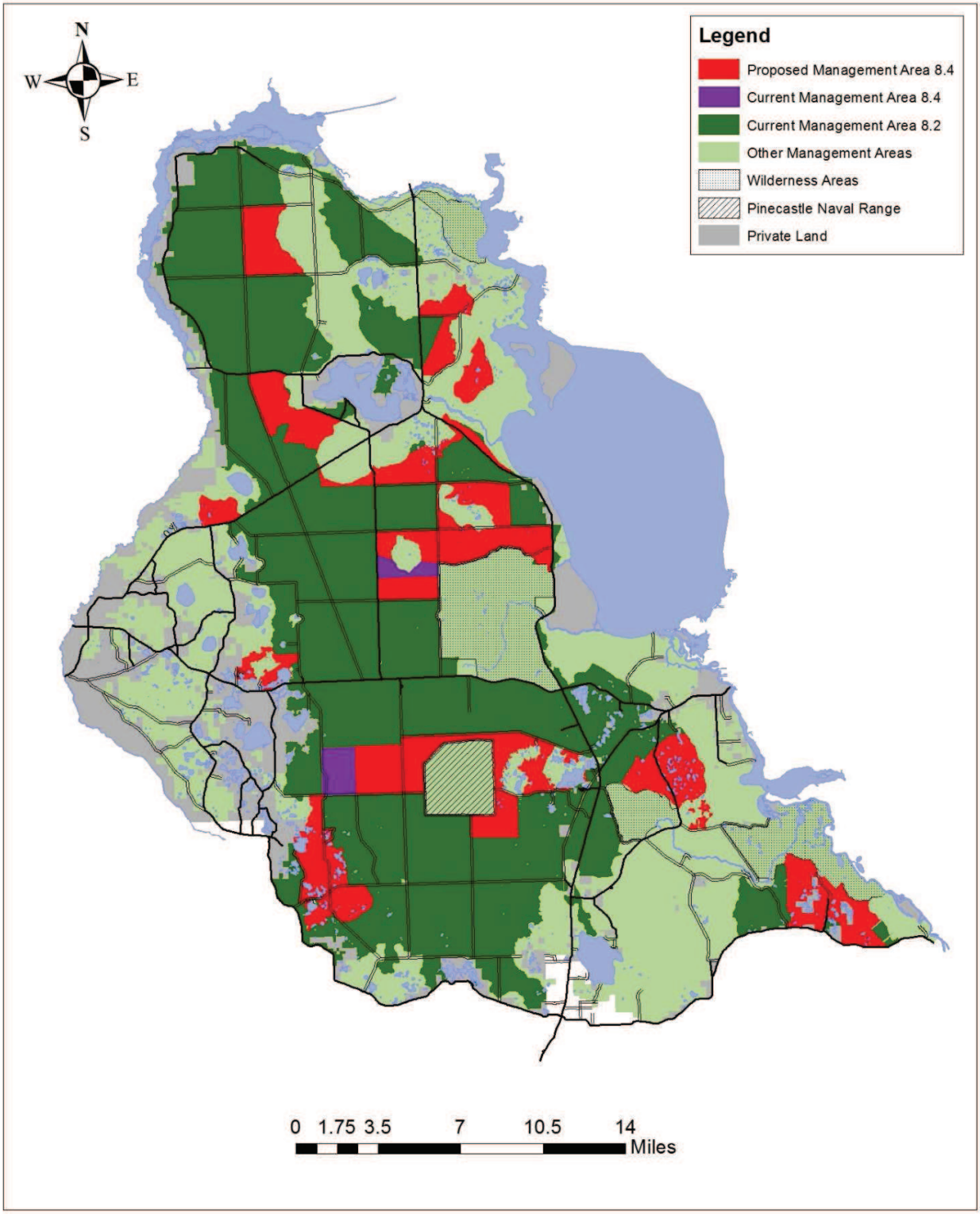
Appendix A. Detailed maps of proposed MA 8.4

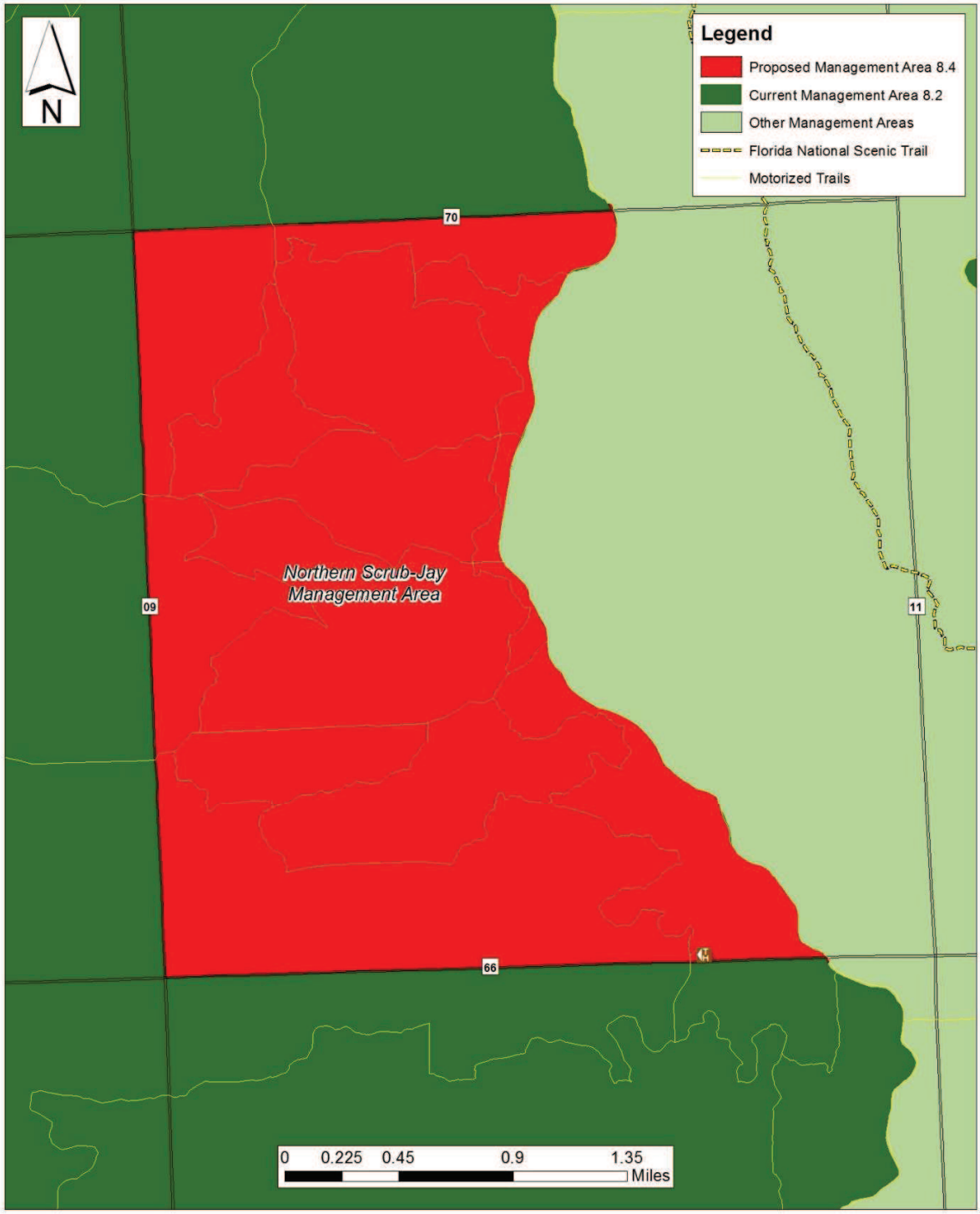
Map 1. Current Extent of Management Area 8.4



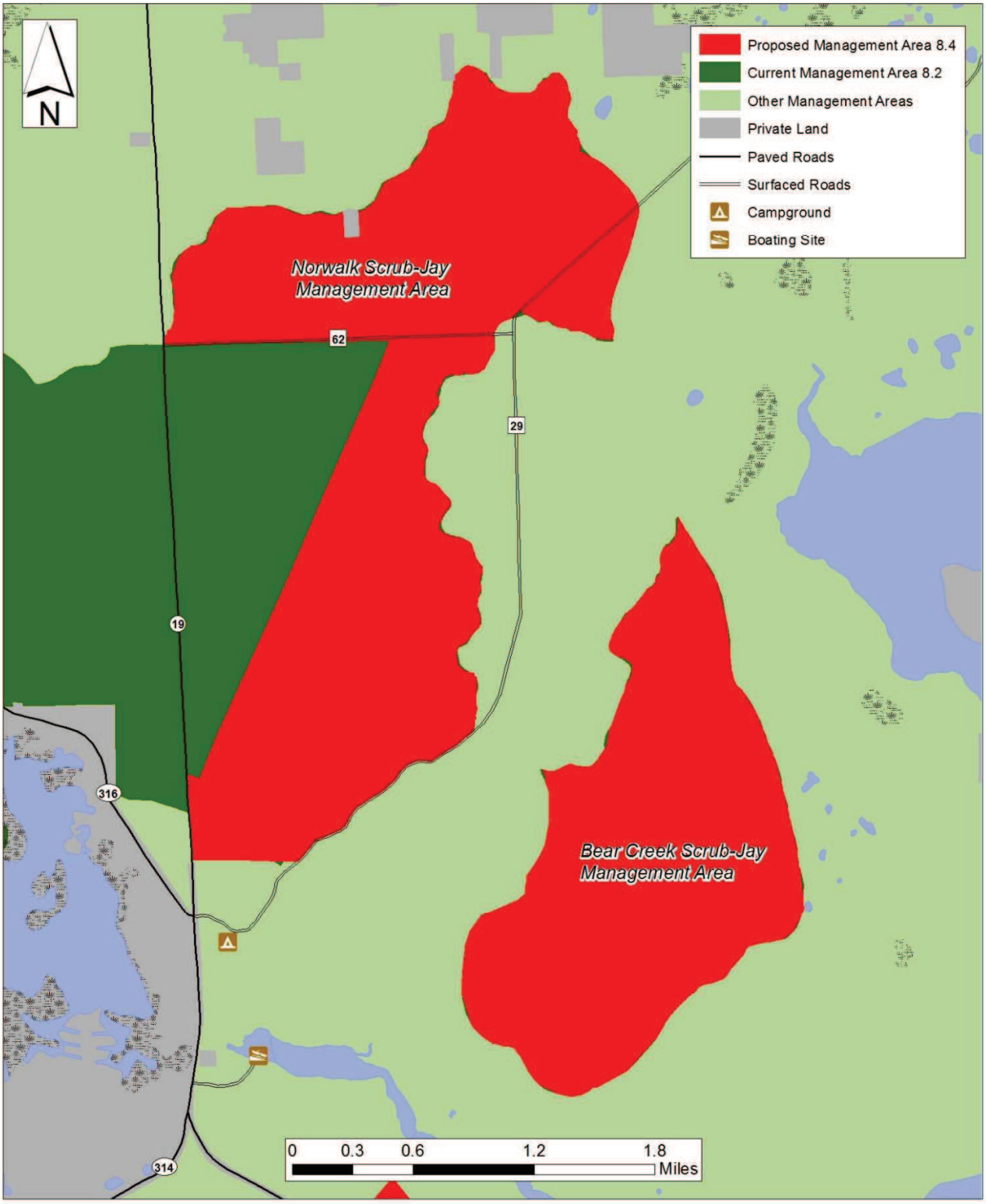
Map 2. Proposed Extent of Management Area 8.4



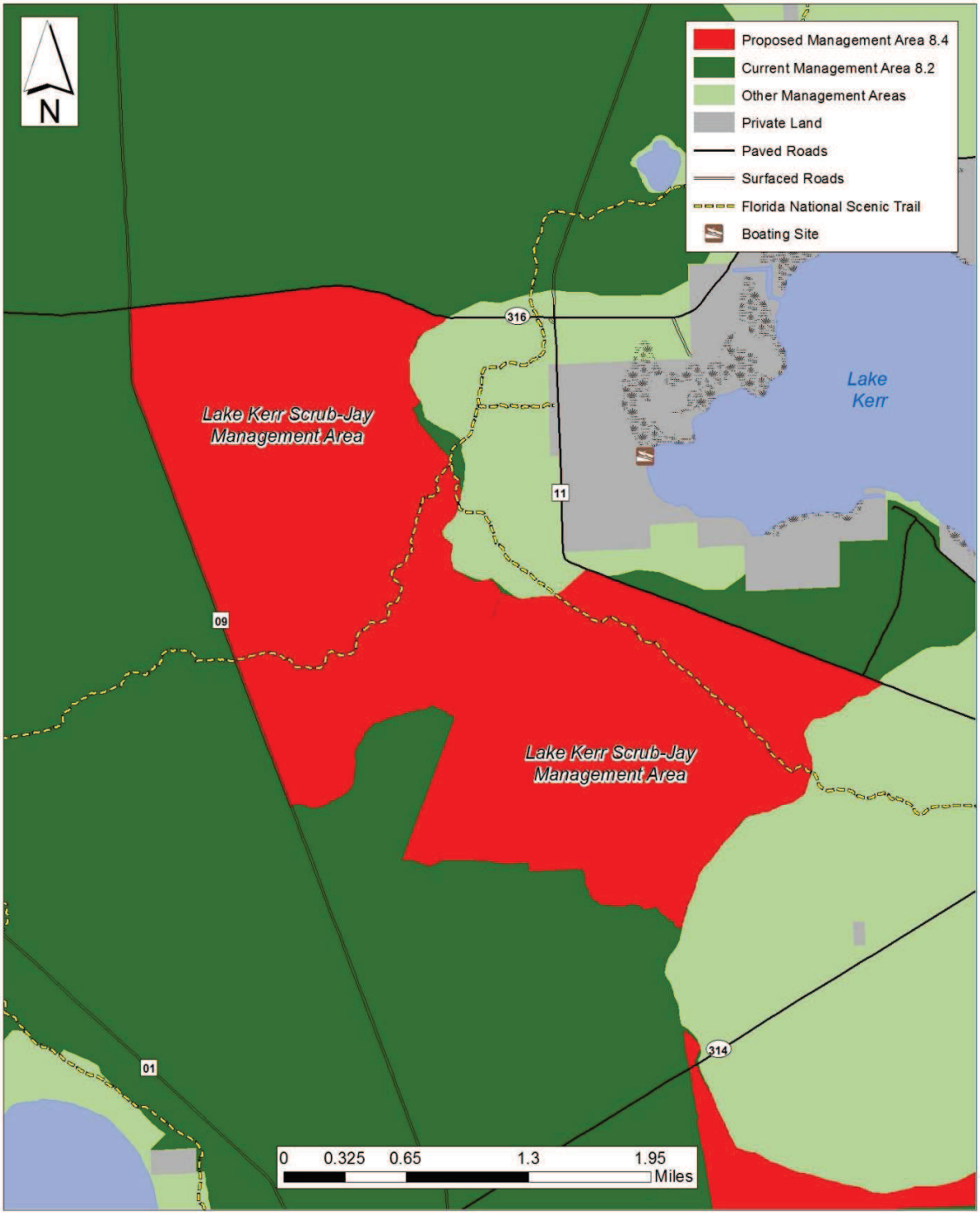
Map 3. Proposed Northern Scrub-Jay Management Area



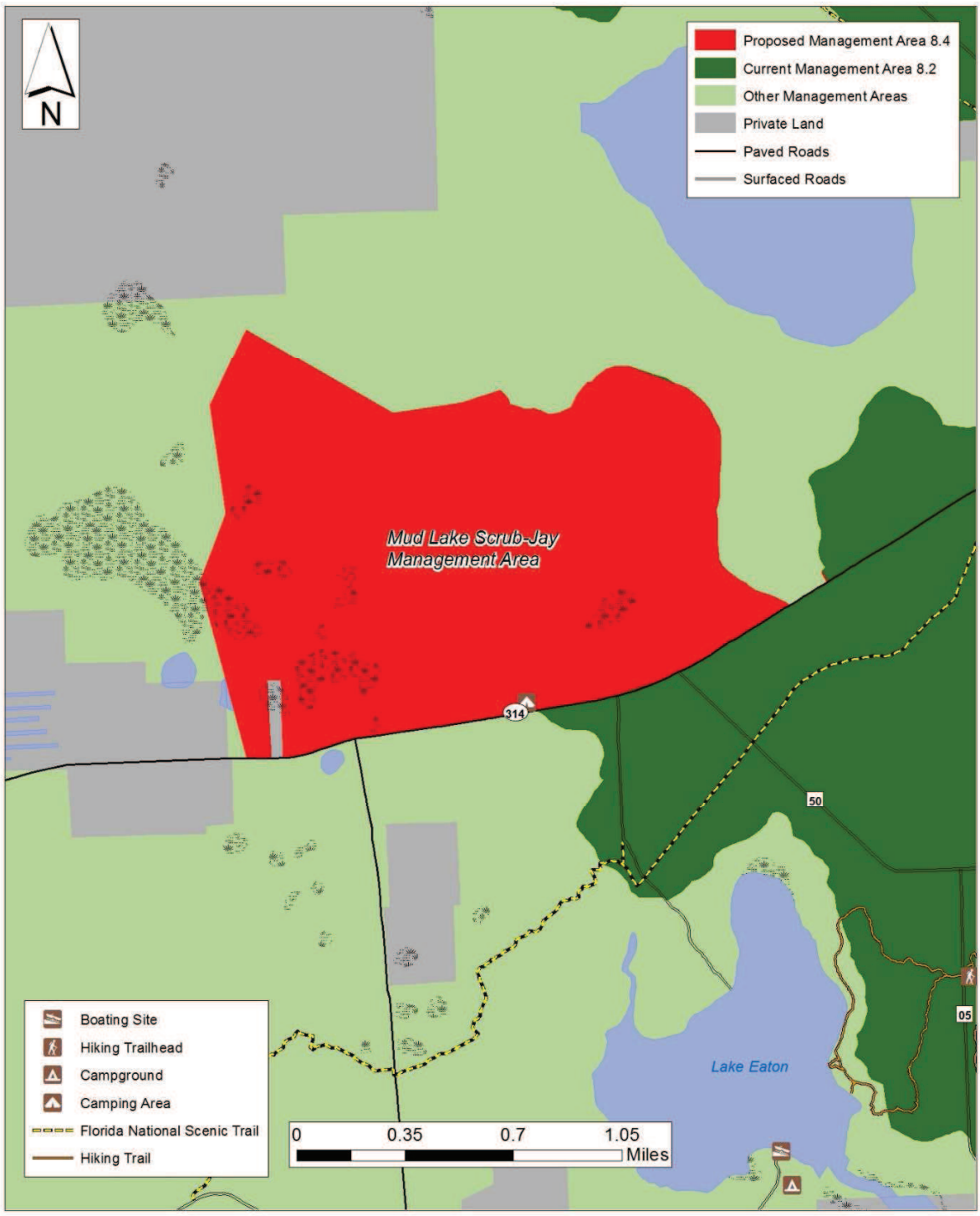
Map 4. Proposed Norwalk and Bear Creek Scrub-Jay Management Areas



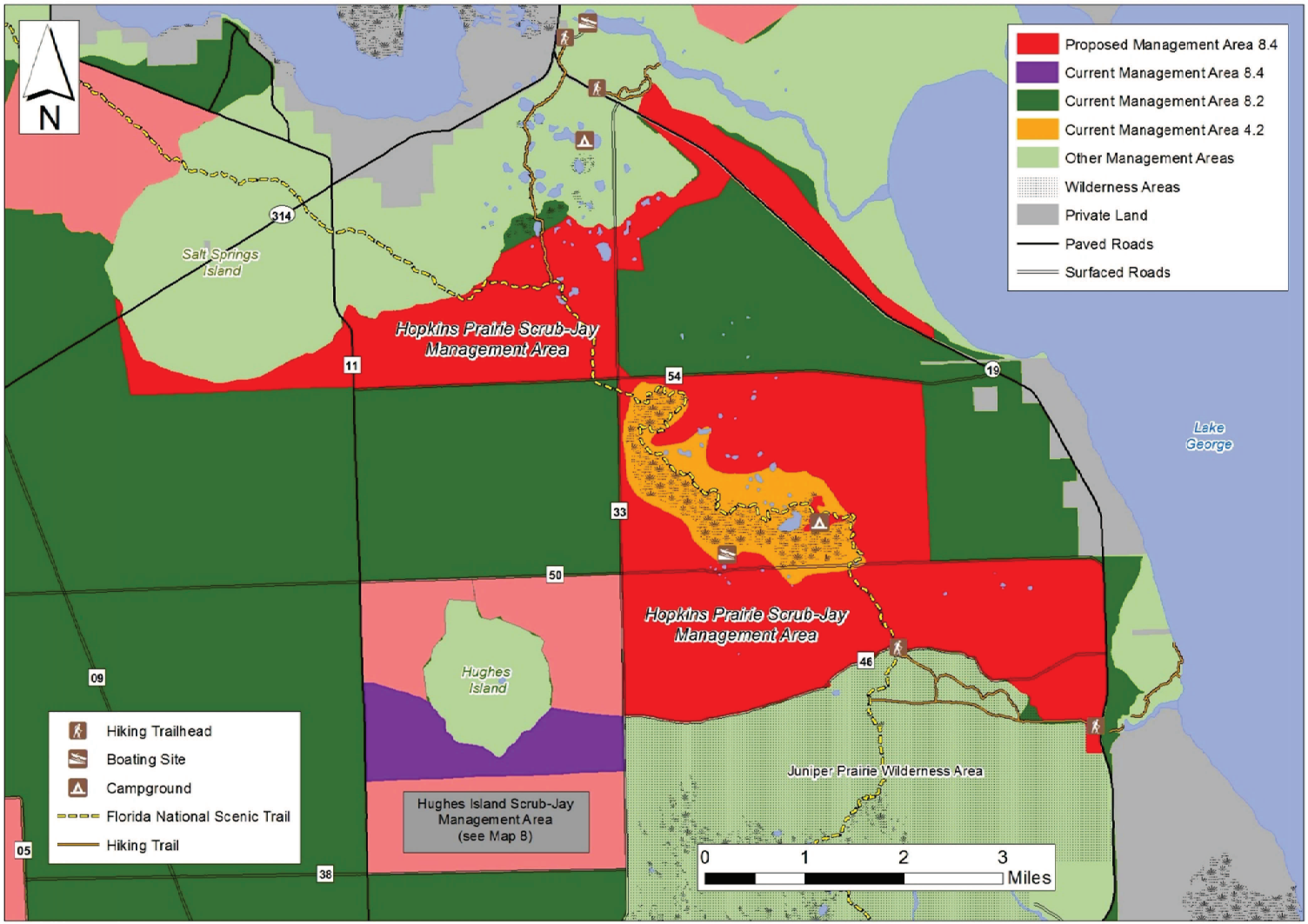
Map 5. Proposed Lake Kerr Scrub-Jay Management Area



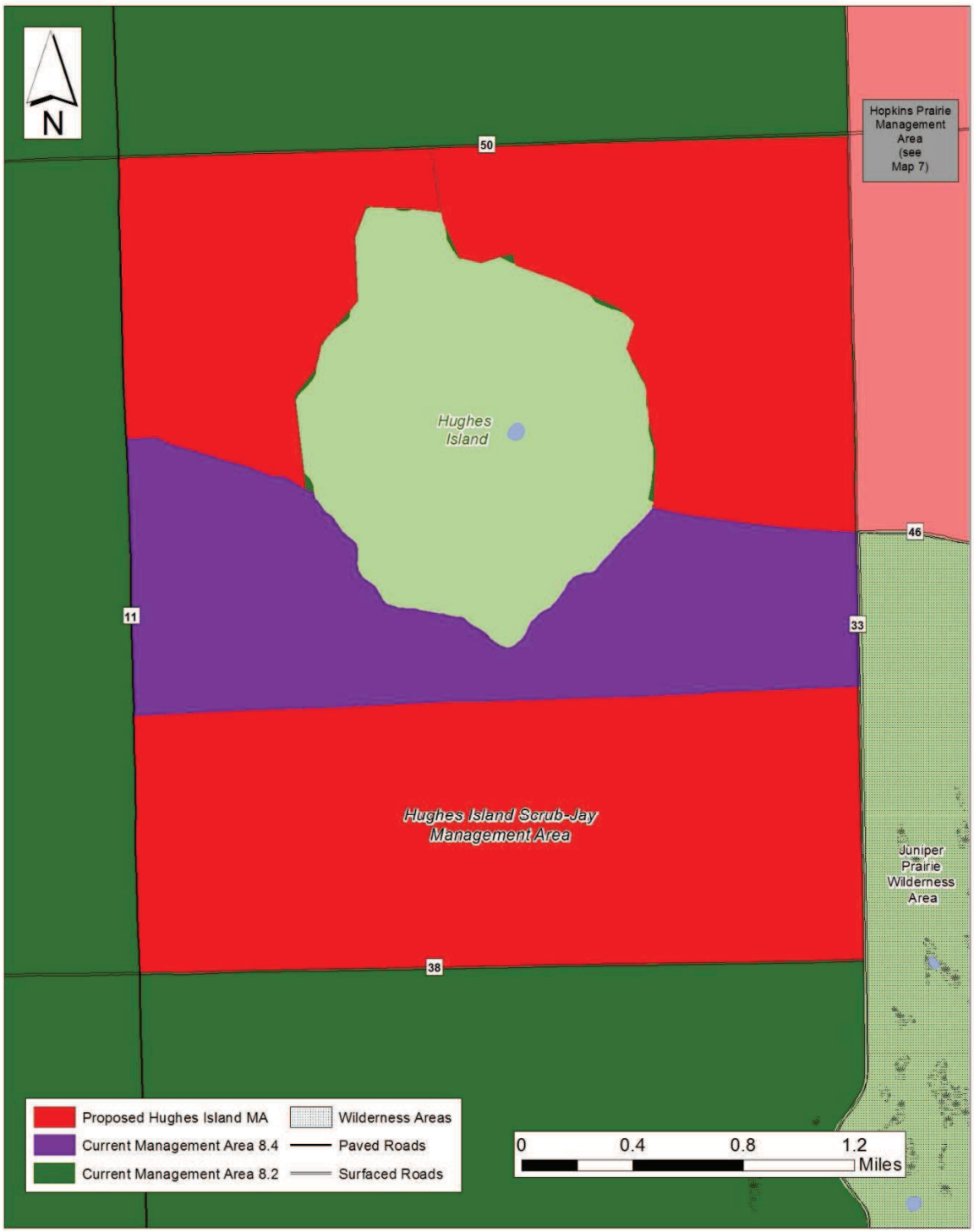
Map 6. Proposed Mud Lake Scrub-Jay Management Area



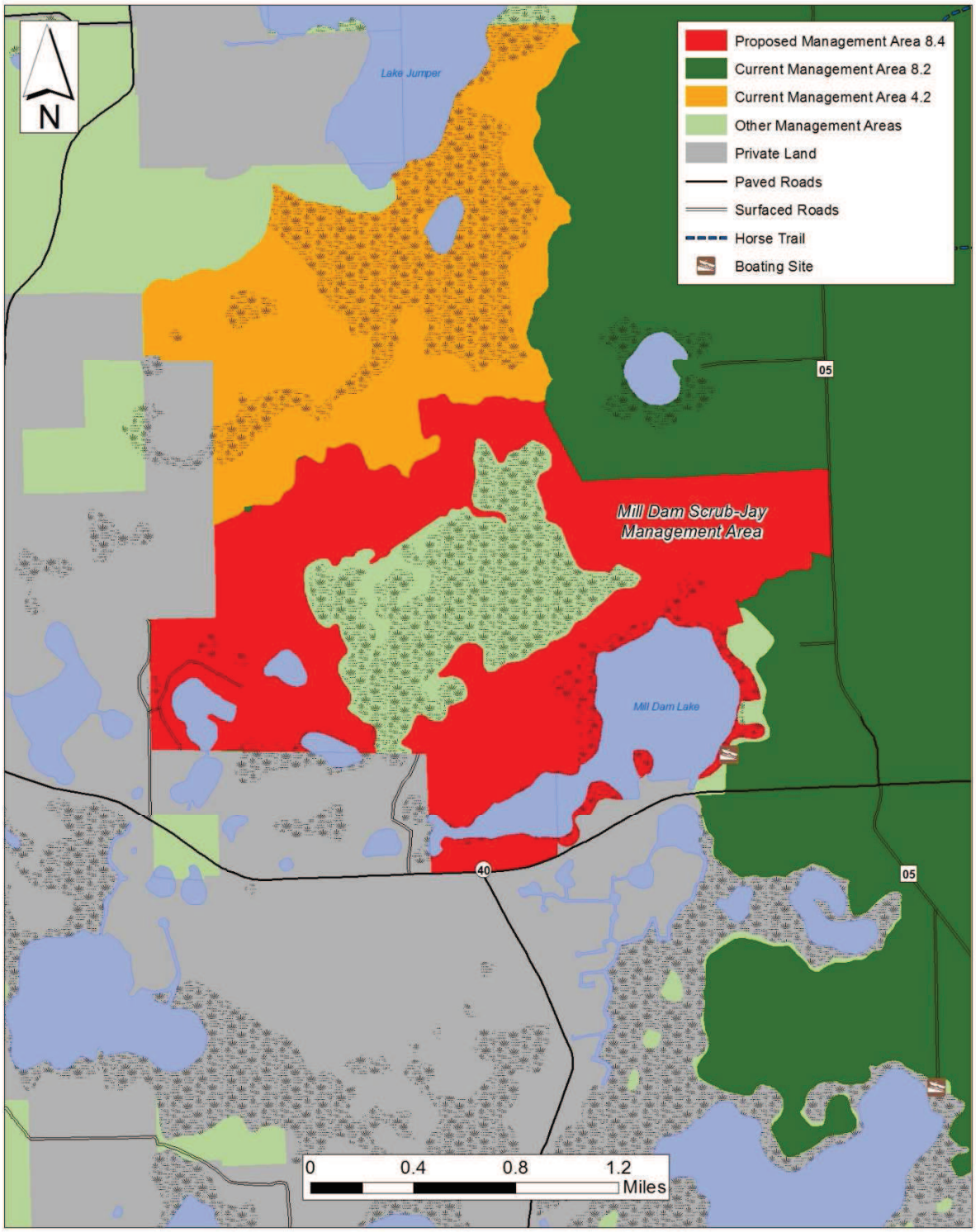
Map 7. Proposed Hopkins Prairie Scrub-Jay Management Area



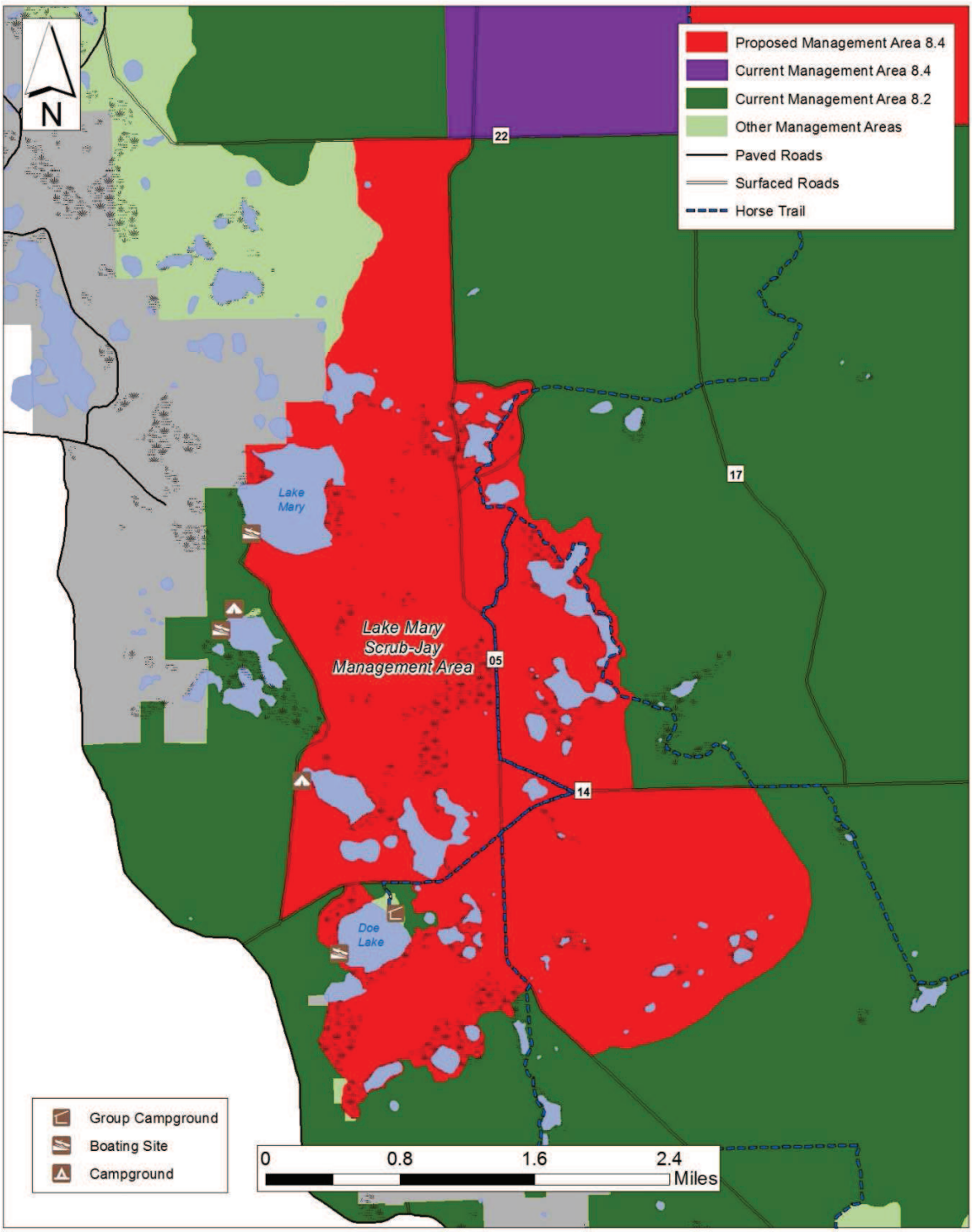
Map 8. Proposed Hughes Island Scrub-Jay Management Area



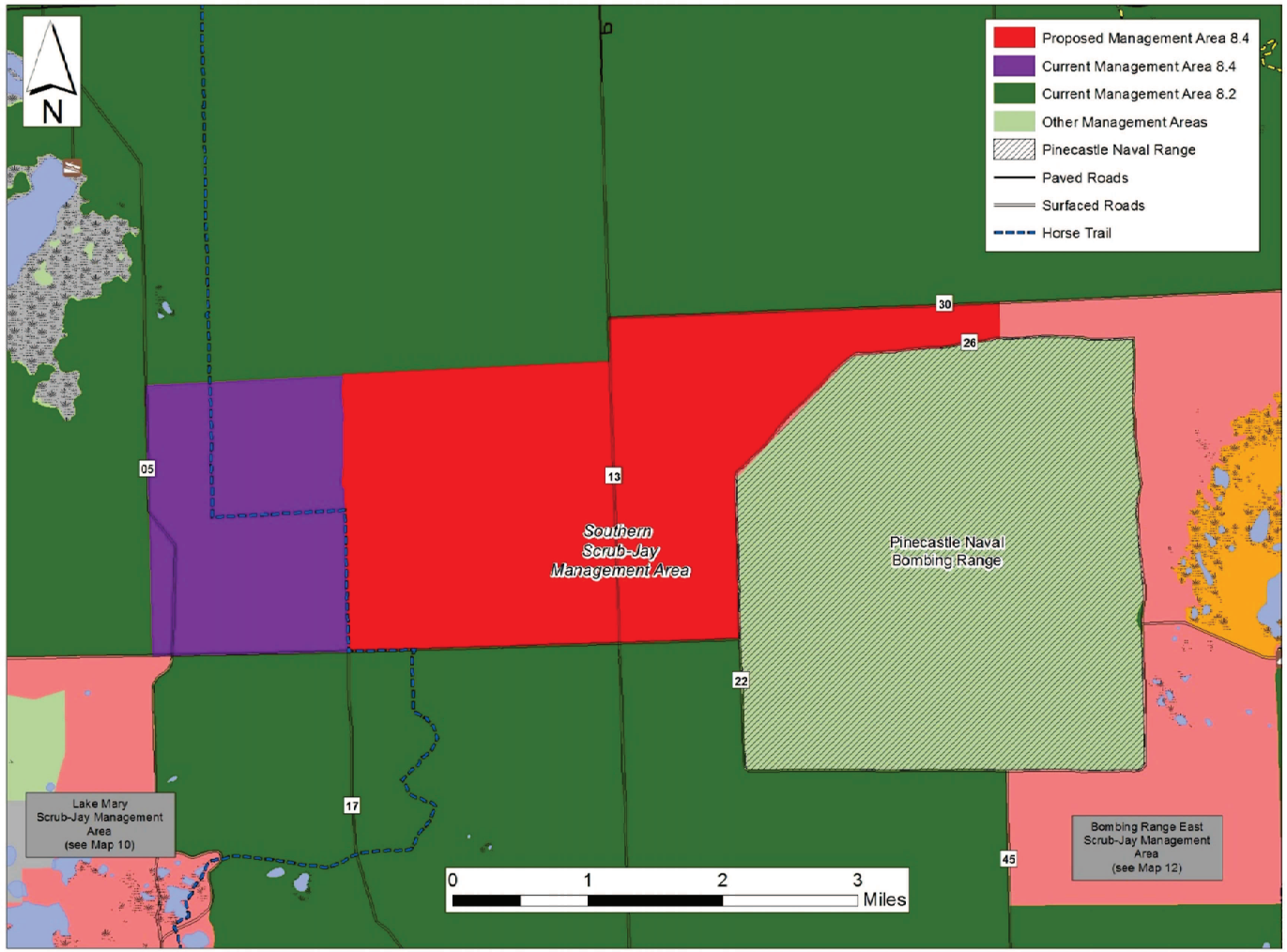
Map 9. Proposed Mill Dam Scrub-Jay Management Area



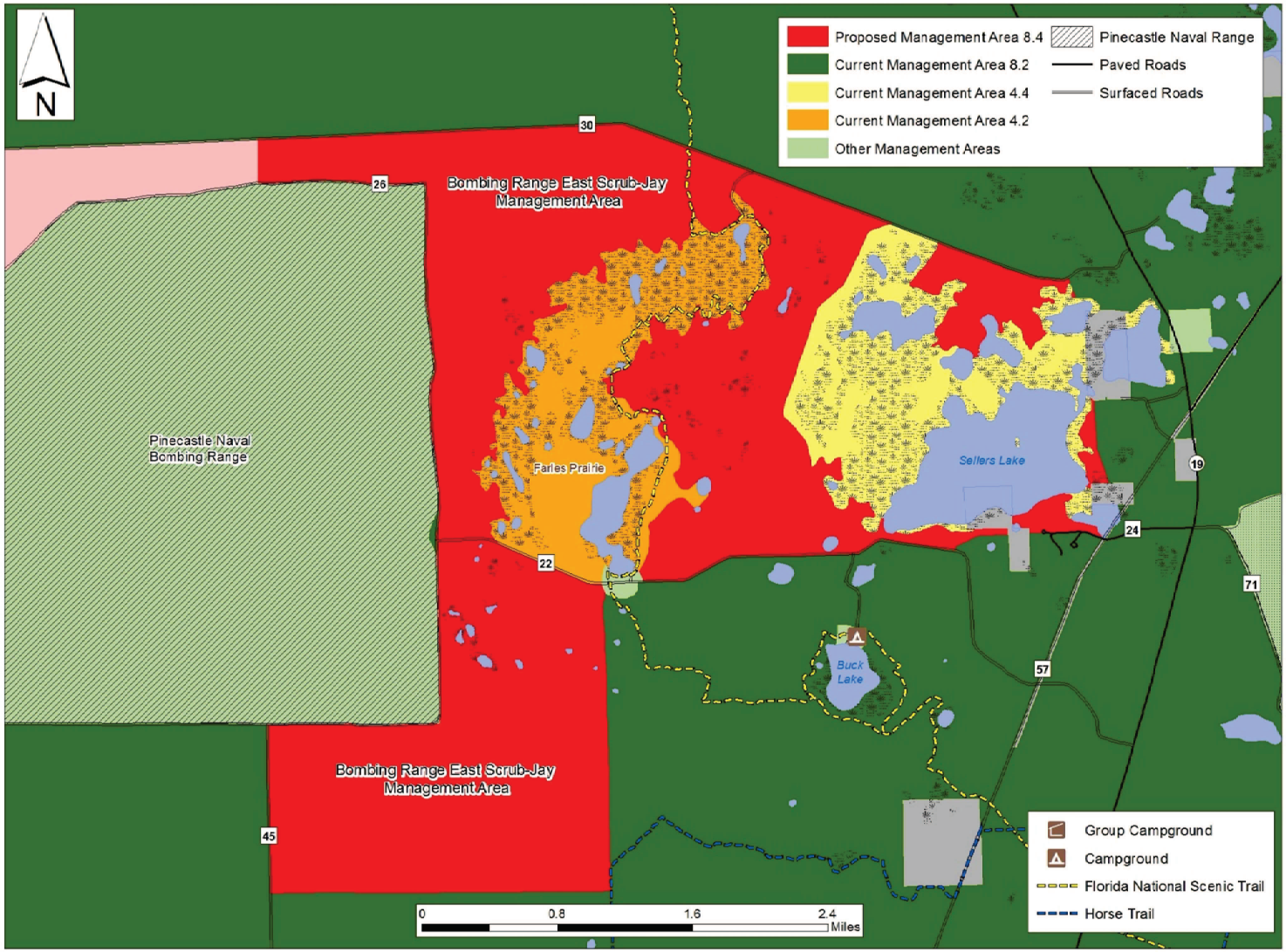
Map 10. Proposed Lake Mary Scrub-Jay Management Area



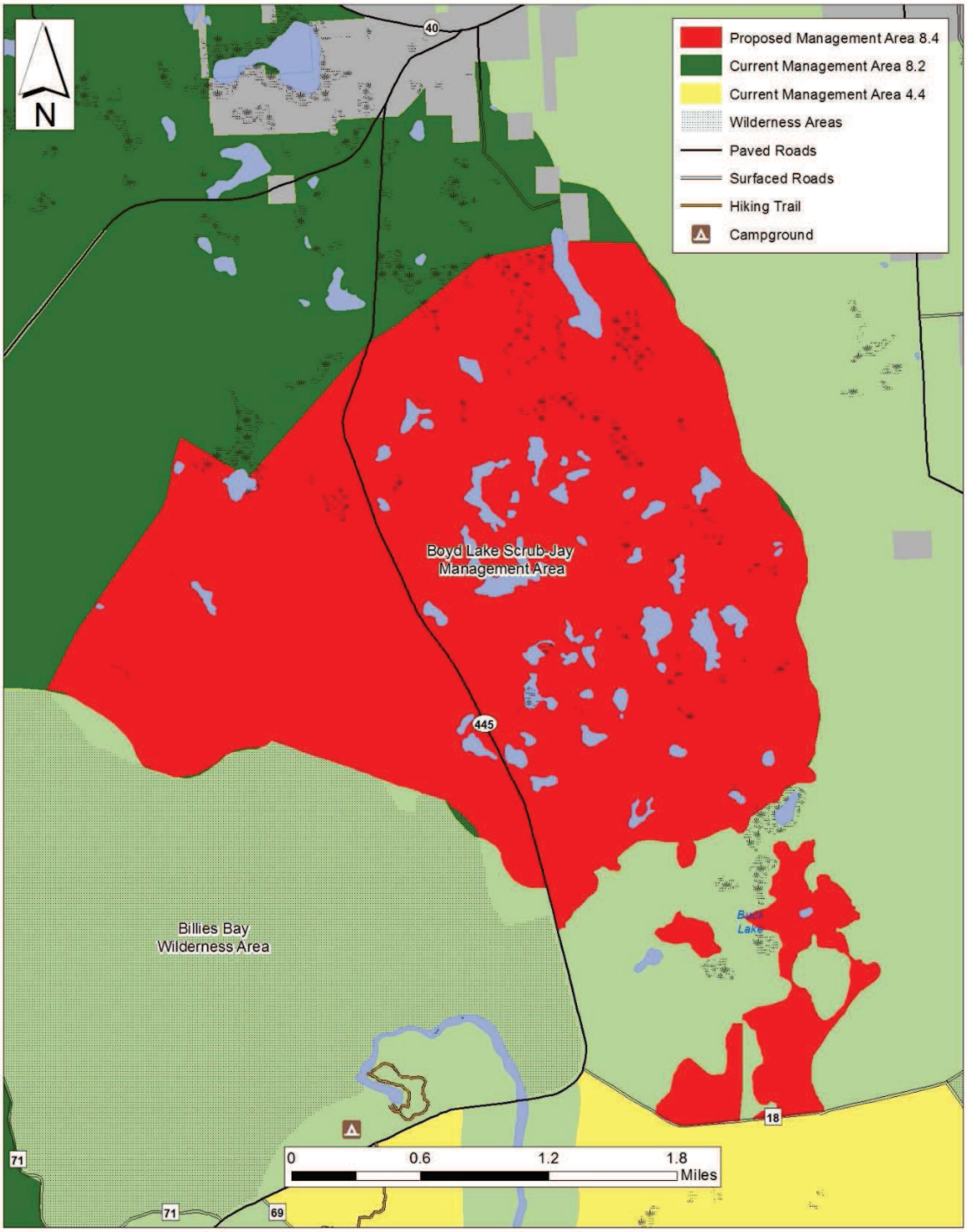
Map 11. Proposed Southern Scrub-Jay Management Area



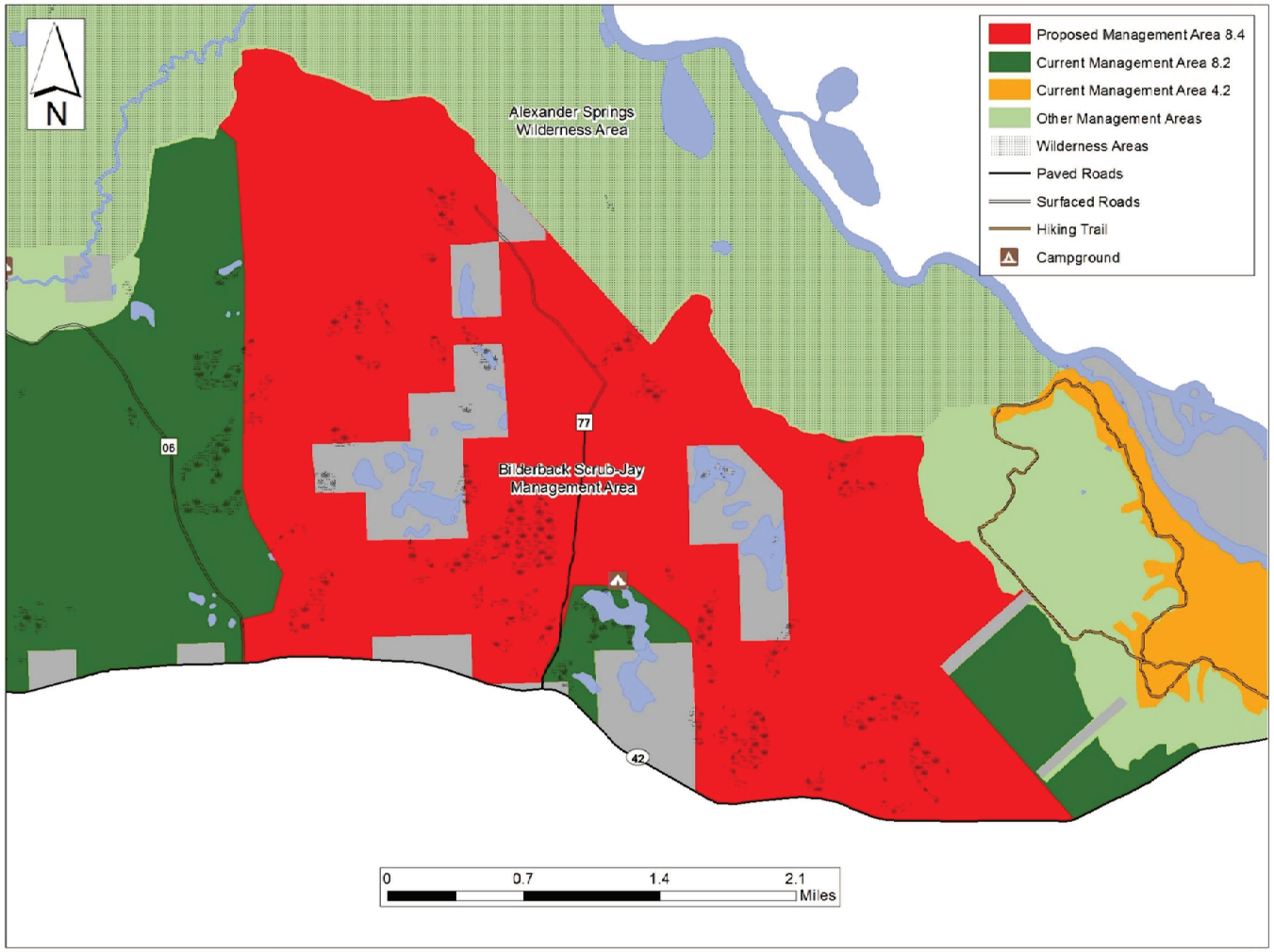
Map 12. Proposed Bombing Range East Scrub-Jay Management Area



Map 13. Proposed Boyd Lake Scrub-Jay Management Area



Map 14. Proposed Bilderback Scrub-Jay Management Area



Appendix B. Effects of expanding MA 8.4 on Florida scrub-jays

Analysis framework

The effects of the Management Area (MA) designation on Florida scrub-jays are best understood as the extent to which land management under the proposed change would deviate from the effects of scrub management already consulted on in the Forest Plan. The Forest Plan Biological Assessment (BA), Forest Plan Biological Opinion (BO) and analysis in Forest Plan amendments considered effects of harvesting ~4,000ac/yr of mature sand pine as well as maintaining open scrub with fire or other vegetation management in the scrub-jay management area (MA 8.4, 2,900ac), the Pinecastle Bombing Range (MA 9.1, 5,500ac) and Juniper Prairie Wilderness (MA 0.2, 8,900ac). Based on these activities, the Forest Plan BA determined that "Implementation of [the Forest Plan]… "MAY AFFECT" the Florida scrub-jay. Scrub-jay nestlings could be killed and nests lost through the use of prescribe fire in suitable scrub-jay habitat." (FEIS, p. F-36). The effects of the MA designation beyond those already considered result from increased chopping, burning or non-commercial vegetation harvest in areas that are waning but possibly still marginally suitable habitat for Florida scrub-jays. Under the current MA 8.2, these sand pine stands would be restocked and allowed to mature until commercial harvest, which results in habitat degradation until the vegetation structure is no longer suitable for scrub-jay breeding or foraging, but does displace scrub-jays as a direct result of federal agency actions.

The suitability of scrub stands for Florida scrub-jay breeding and foraging habitat is a function of the height, density and patchiness of vegetation, particularly oaks. Suitable habitat is discussed in these terms in the Biological Assessment (p. 4 and elsewhere). However, because detailed vegetation structure data are not available for all the stands proposed for designation as MA 8.4, this analysis uses stand age as a proxy for habitat structure. Experience on the Ocala National Forest and recent monitoring efforts suggest that current habitat structure is highly predictable based on time since last sand pine timber harvest, which is the primary mechanism for resetting vegetation succession in most of these stands. As stands are chopped and burned multiple times they may become patchier and retain suitable structure for scrub-jay breeding longer than 12yr, but past vegetation management has produced a predictable relationship between time since harvest and vegetation structure.

The activities described below are used here solely for the purpose of informing a robust, objective and quantitative analysis for how management changes would affect the Florida scrub-jay. This Forest Plan amendment does not propose any site-specific management activities and, if approved, implementation of the management strategy described here would require future analysis, public involvement and consultation with the USFWS.

Management activities

The proposed MA designation will only achieve the desired outcome if management activities are implemented to increase and then maintain the area of open scrub habitat. As described in the proposed action section of the BA, management of the new 8.4 would primarily consist of harvesting mature sand pine and resetting vegetation succession in areas that are waning habitat for Florida scrub-jays and other species that prefer open scrub. The current condition of the 51,850ac proposed for designation as MA 8.4 is primarily oak or pine scrub (44,706ac) with scattered prairies, wetlands, hardwood areas and pine flatwoods. The age structure of scrub stands is fairly typical of the Ocala National Forest, with ~3% (1,200ac) 0-2yr since harvest, ~14% (6,377ac) suitable scrub jay habitat 3-12yr after harvest and ~83% older than 12yr. By contrast, managing to maximize suitable habitat would generate an age structure of ~23% 0-2yr since harvest and 77% 3-12yr since harvest with no stands allowed to degrade to unsuitable habitat conditions through vegetation succession. The shift in management from the current conditions to the desired vegetation structure would be implemented over 20-25yr, and consists of two phases:

First ~20yr – catch up

- Burn/chop 10%/yr of the 3-12yr age class that is suitable but waning habitat
    - The acreage burned or chopped will increase gradually from 750 to 3,000ac over 20yr
    - The goal is to reset vegetation succession before the stand becomes completely unsuitable
- Harvest 2,000ac/yr mature sand pine (unsuitable habitat)
    - Currently, 37,129ac of the 44,706ac of scrub proposed for MA 8.4 is >12yr succession
    - No 3-12yr post-harvest habitat should transition into >12yr unless the vegetation structure still meets the desired conditions for high-quality scrub-jay habitat
    - Therefore, in 18-20yr there should be little or no scrub habitat >12y post-succession in MA 8.4

Transition and maintenance

- After 18-20yr, the 0-2yr age range will be slightly over-represented, comprising ~30% of the area, due to accelerated harvest of mature sand pine.
- However, by chopping/burning 3,439ac of waning habitat each year, the forest will transition to and then maintain an even age distribution from 0-12yr succession in which ~3/4 of the area (~34,400ac) will be in the suitable age range at any given time.

Figure 1 shows the acreage of the two primary management activities (harvesting mature sand pine and chopping or burning waning habitat) over time. The effects of this management strategy on scrub age structure are shown in Figure 2 below.

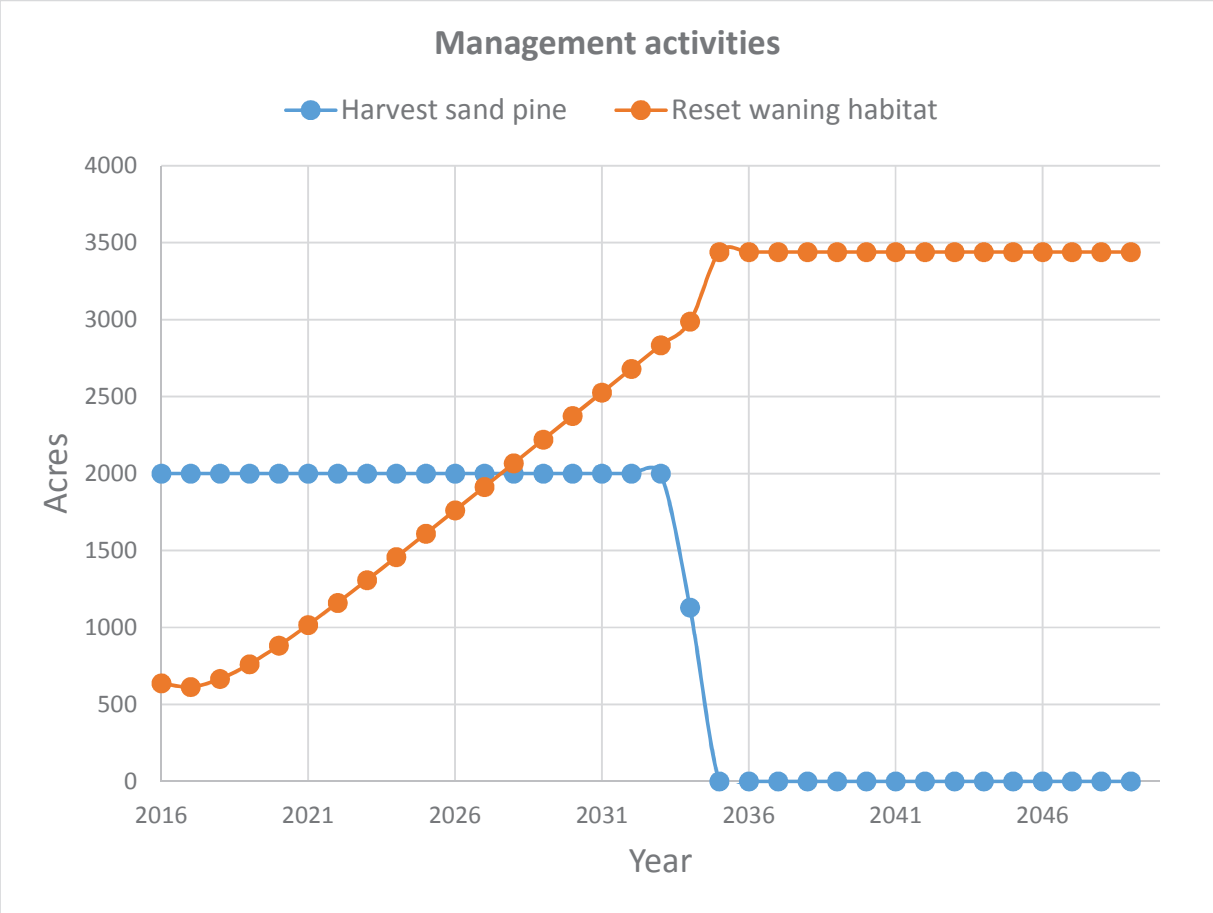


Figure 1. Management activities in scrub habitat proposed for designation as MA 8.4

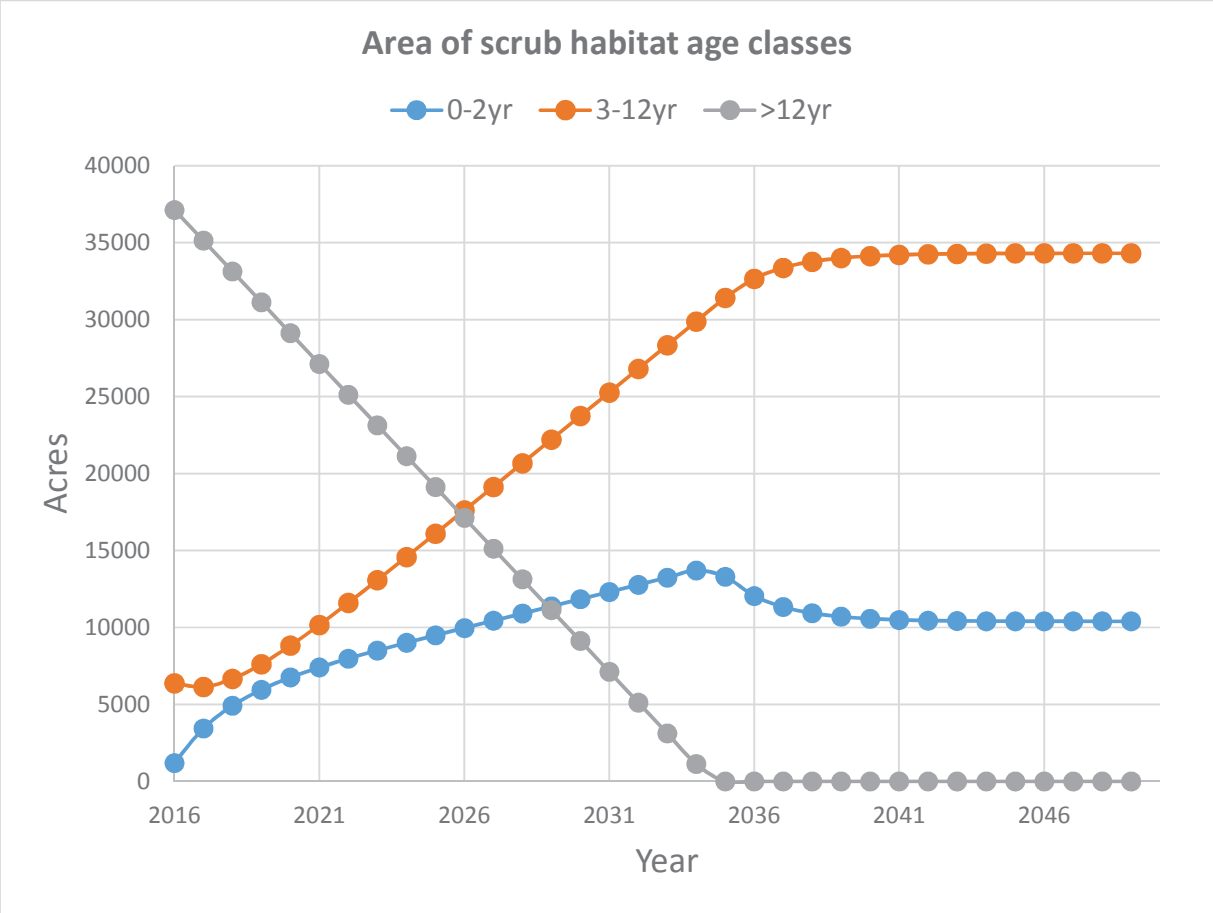


Figure 2. Acreage of three scrub age classes over time in area proposed for MA 8.4.

Effects on scrub habitat and Florida scrub-jays

Implementation of the activities described above would have both indirect and direct effects on Florida scrub-jays. The indirect effects would result from the changes in habitat structure, whereas the direct effects would result from management activities conducted in waning but still suitable habitat where scrub-jays may be maintaining territories or nesting.

To estimate the effects of these management activities, we considered the best available information about Florida scrub-jays on the Ocala National Forest from recent monitoring efforts and observations of how past management has affected scrub-jays. Given the large scale of this project, we made some reasonable assumptions about management activities and Florida scrub-jay habitat occupancy based on Miller's (2015) reports and other published work on scrub-jays:

- Habitat suitable at 3-12yr post-succession (harvest, chopping or fire)
- Estimated group density in relation to stand age from Miller

    - Overall average within this range is 3.8 groups/100ac
    - Average of waning habitat (10-12yr post-harvest) is 3.2 groups/100ac
- 25ac per Florida scrub-jay group
- The 2000ac of mature sand pine harvested would have no direct effects on scrub-jays since this would be unsuitable habitat. The indirect effects would be positive since the stands would be suitable for foraging within a year after harvest and suitable for breeding within 3yr.
- Resetting vegetation succession would be implemented on 10% of the area in the 3-12yr age class
    - 500ac of this would be chopped and the rest (variable over time, increasing to ~3,439ac annually) would be prescribed fire
    - Resetting vegetation succession would displace scrub-jays because that habitat would be waning but still marginally suitable
    - Prescribed fire would most likely occur during the fall, winter and spring. For purposes of this analysis, we estimated that 25% of the prescribed fire would be conducted during the Florida scrub-jay breeding season of Mar. 1-June 30 and that all the acres burned during this time would have nests at a density of 3.2/100ac

The primary indirect effect of implementing the management actions described above would be increased creation and maintenance of open scrub habitat, which will result in increased habitat capacity for scrub-jays. The management strategy described above will shift the age structure of scrub vegetation in the area from >80% sand pine stands >12yr post-harvest to a matrix of patches with 0-12yr of vegetation succession. The acreage of each age (1yr increments) will be approximately equal, and management activities would be designed to achieve and then perpetuate ~3/4 of the total area in the 3-12yr age class. As shown in Figure 3, this management shift would increase the habitat capacity for scrub-jays to approximately 1,300 groups within 20-25yr.

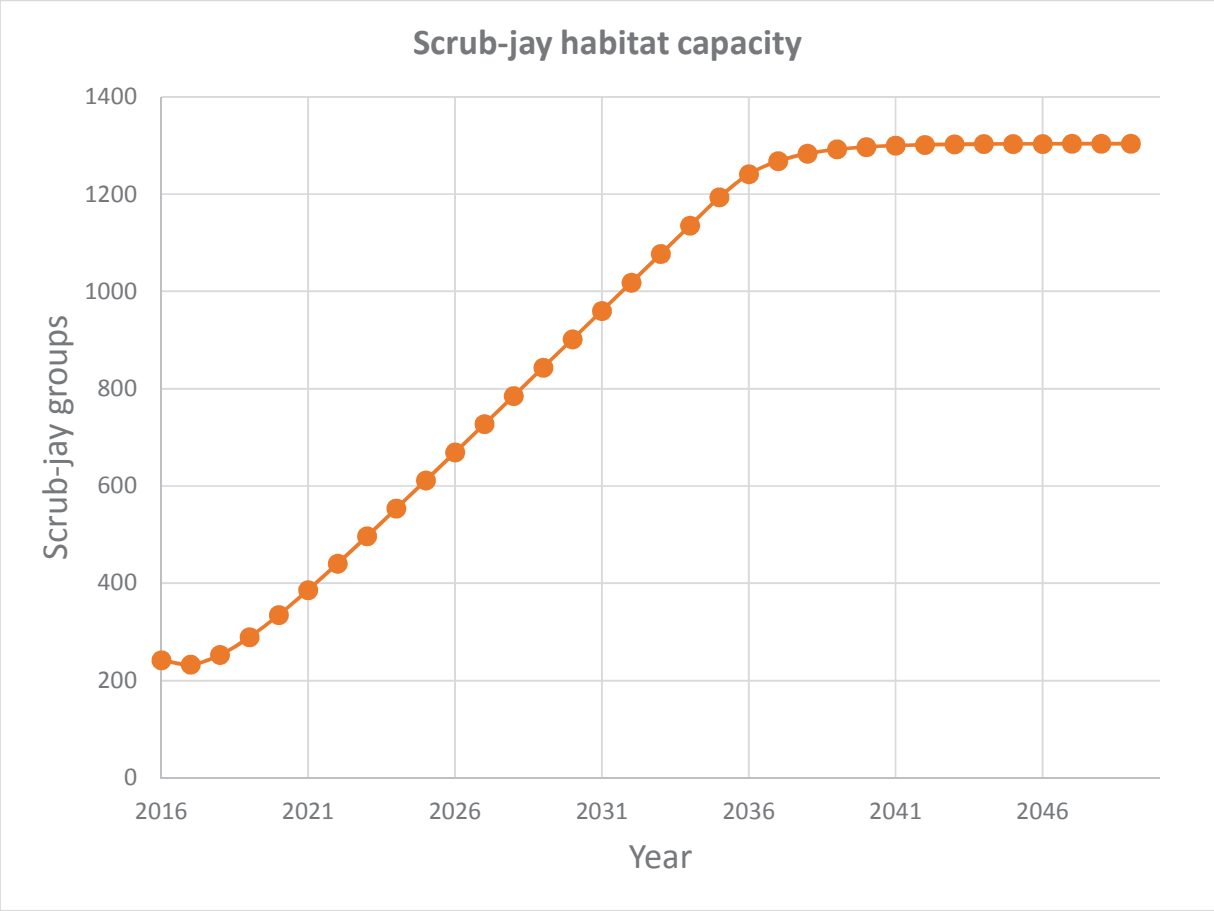


Figure 3. Habitat capacity for scrub jays if management actions in Fig. 1 are implemented, resulting in habitat age distribution shown in Fig. 2.

The direct effects on scrub-jays of implementing the management activities described above include displacement due to chopping or prescribed fire conducted during the non-breeding season and disruption of nesting/destruction of nests from prescribed fire conducted in marginal habitat during the breeding season. The estimates and assumptions described above were used to calculate these effects, which are rounded up to provide a conservative estimate. As shown in Figure 4 below, as the acreage of suitable habitat increases, the number of scrub-jay groups displaced will increase to ~110/yr and the number of nest destroyed will increase to ~24/yr.

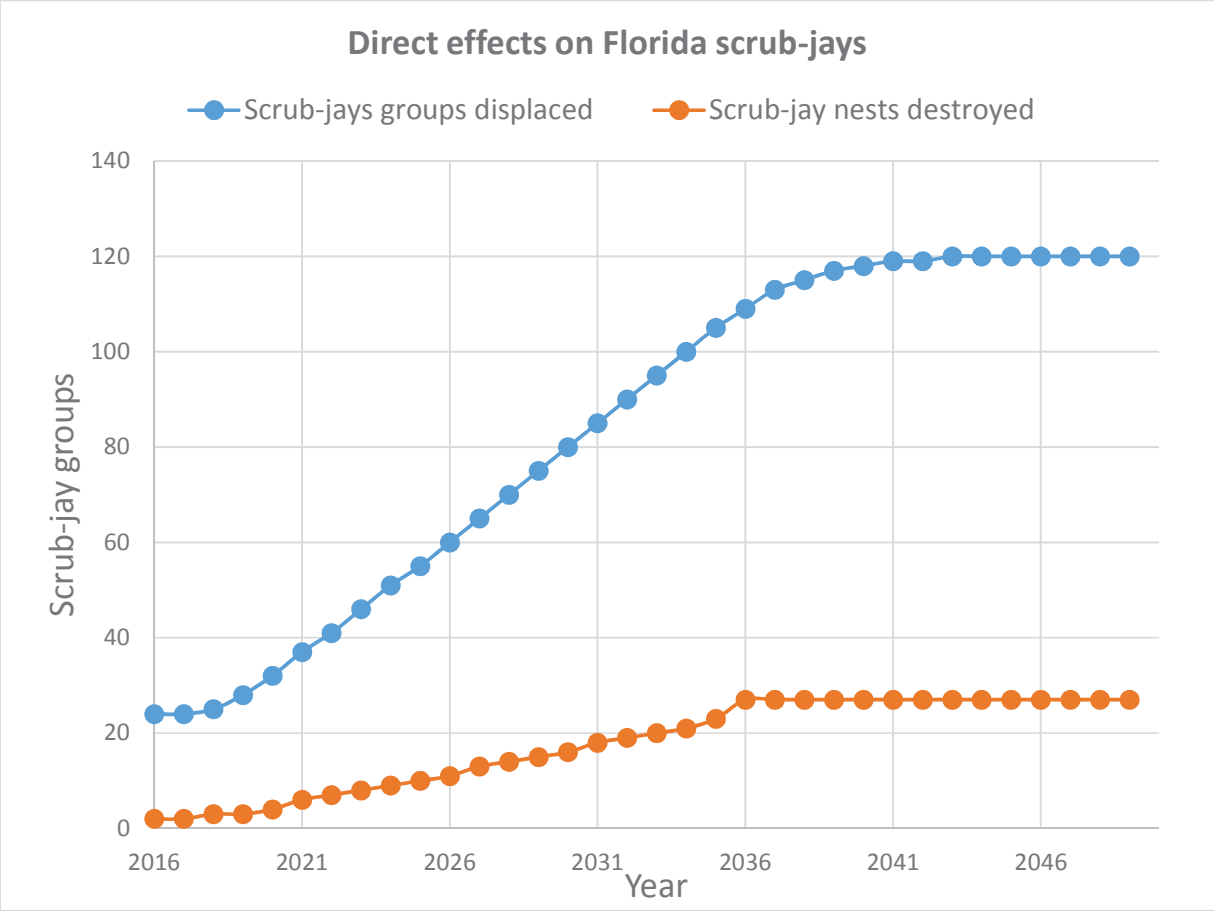


Figure 4. Estimates of scrub-jay groups displaced and nests destroyed if the actions in Fig. 1 are implemented.

Although displacing ~8.5% of Florida scrub-jay groups each year may seem like a substantial impact relative to the Florida scrub-jay population size on the Ocala NF, active management provides more long-term scrub jay habitat than alternative strategies. Recent research on Merritt Island convincingly shows that optimal Florida scrub-jay habitat is maintained by resetting succession on stands before they become completely unsuitable for jays (Johnson et al. 2011). Below we briefly consider two alternatives: status quo management for sand pine timber and delayed chopping or burning until the habitat is no longer suitable. This comparison very clearly demonstrates the overall benefits of the proposed management for Florida scrub-jays, and is shown graphically in Figure 5 below.

If the 44,706ac area the currently being considered is managed under the status quo with increased harvest of mature sand pine (2,000ac/yr), it would eventually contain ~20,000ac of suitable Florida scrub-jay habitat in the 3-12yr age range. This could support a scrub jay population of ~760 groups, although the increase would be quite

gradual. This would be a substantial increase compared to the current conditions of 6,377ac of suitable habitat, but much less than the 1,304 groups that would be supported by the proposed action. Scrub-jay groups would be displaced due to natural vegetation succession rather than active management, with ~76 groups losing territories each year due to habitat becoming unsuitable. No nests would be destroyed, but research has shown that nests in lower quality habitat (i.e., denser and taller oaks and pines) are less successful than nests in higher-quality habitat.

A second alternative would be delaying active management to avoid direct effects on Florida scrub-jays. Under this strategy, stands would be allowed to reach 15yr post-succession before being chopped or burned. Scrub-jays occupy virtually no stands of this age, so the management activities would not displace groups or destroy nests. However, because of the added time in the management cycle (16 instead of 13 years), only 27,942ac would be in the suitable age range compared to 34,389ac under the proposed management strategy. Additionally, 1/10 of the scrub jay groups would be displaced by vegetation succession due to lack of management.

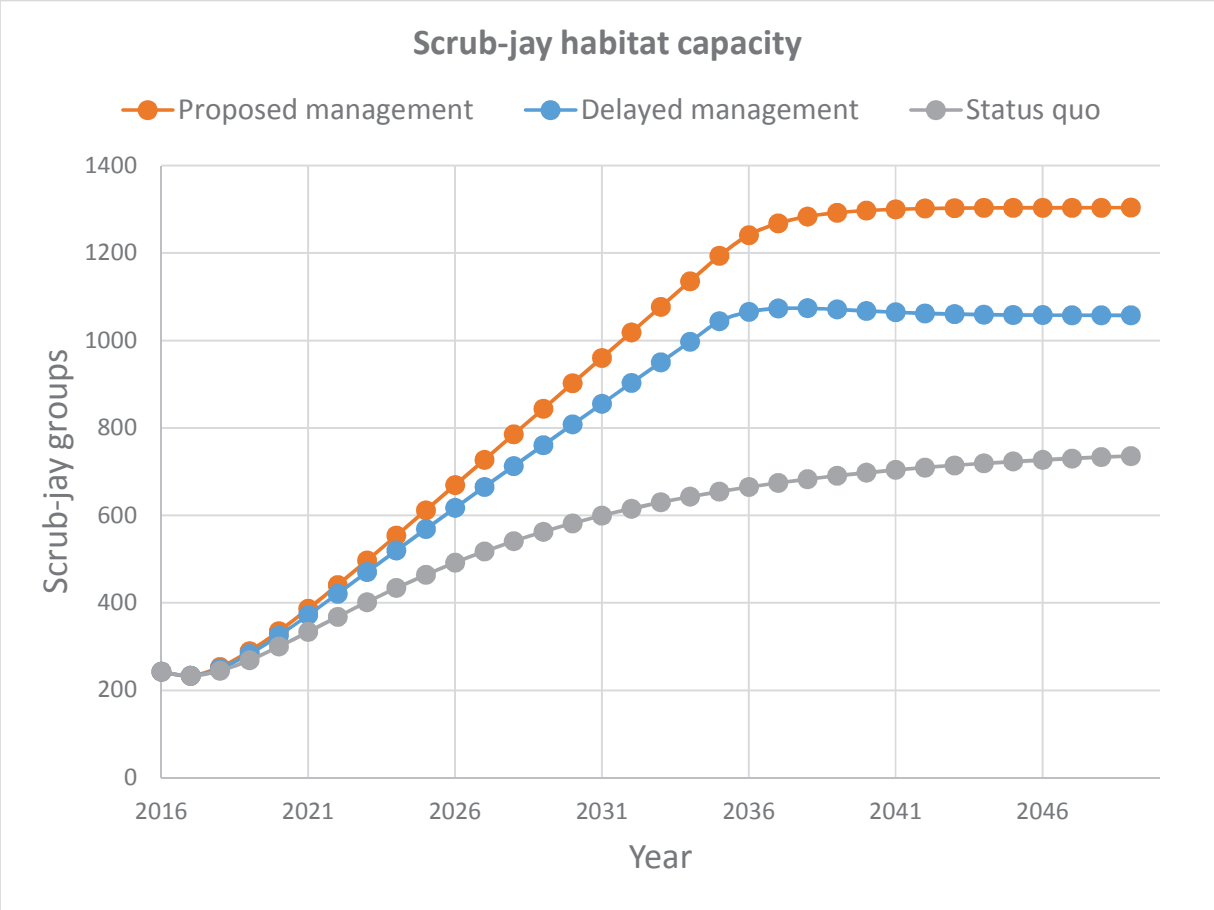


Figure 5. Habitat capacity under three management strategies.

Summary of effects

Implementation of the proposed management changes may affect, and is likely to adversely affect Florida scrub-jays. Active scrub management, primarily chopping and burning in waning but still suitable habitat, will displace scrub-jay groups from their territories and will result in loss of a small number of nests. However, if left unmanaged, stands where scrub-jays would be displaced would soon be unsuitable due to vegetation succession at a rate equal to the negative effects of proactive scrub management. Additionally, these consequences are incidental to a management strategy that after full implementation would increase breeding habitat for scrub-jays by ~28,000ac (currently ~6,400ac of 3-12yr scrub in the area proposed for change, ~34,400ac would be maintained after implementation of the management strategy described above. This expanded area of preferred breeding habitat will be capable of supporting ~1,300 Florida scrub-jay groups, which is more than currently exist on all protected lands outside of the Ocala National Forest. This habitat capacity will be in addition to suitable habitat created by continued sand pine harvest in MA 8.2 (~2,000ac./yr) as well as continued prescribed fire and wildfire in the Juniper Prairie Wilderness and Pinecastle Bombing Range.